PB87-189759

Superfund Record of Decision (EPA Region 7) Ellisville Area Site - Bliss and Contiguous Properties, St. Louis County, Missouri September 1986. (Second Remedial Action)

(U.S.) Environmental Protection Agency
Washington, DC

29 Sep 86

U.S. Department of Commerce
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16. ABSTRACT

The Ellisville Site Area, located in West St. Louis County, Missouri, is composed of three non-contiguous properties: the Rosalie property; the Callahan property; and the Bliss property. The Rosalie and Callahan properties were the focus of the July 1985 first remedial action. This second remedial action focuses on the Bliss property and four contiguous properties: the Dubman and Weingart property; the Primm property; the Wade and Merchantile Trust Company property; and the Russell, Evelyn and Jerry Russell Bliss property. Land use in the site vicinity consists of rural, recreational and rapidly developing residential areas. Approximately 1,000 people currently live within a one-mile radius of the site. During the 1960s and 1970s, Russell Bliss owned and operated the Bliss Waste Oil Company, a business engaged in the transportation and disposal of waste oil products, industrial wastes and chemical wastes. The company's headquarters and operating facilities were located at the site. In September 1980 the Missouri Department of Natural Resources and the U.S. EPA conducted an onsite investigation. Concluding reports indicated pits had been dug and used for industrial waste disposal; drums of waste had been buried on site; and liquid wastes had been applied on the ground. The types of waste were reported to include solvents, oils, pesticides, and can coating materials. Dioxin is currently the only contaminant of

(See Attached Sheet)

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
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Ellisville Site Area, MO
(Second Remedial Action)

16. ABSTRACT (continued)

threat. Approximately 20,000 cubic yards of soil, and an unknown volume of dust are contaminated with 2,3,7,8-TCDD (TCDD or dioxin).

The selected remedy for the dioxin contaminated soils and materials includes: excavation and containerization in semi-bulk sacks of dioxin contaminated soils and material exceeding one part per billion; interim onsite storage of the containerized wastes in a metal building enclosure; O&M will include maintenance of the security system, maintenance of site runon/run off controls and ground water sampling and analysis. Final remedial action for dioxin-contaminated soil has not been selected. The selected remedy for buried drums and non-dioxin hazardous waste mixtures includes: excavation, sampling, and overpacking of buried drums; excavation of uncontainerized hazardous wastes and contaminated soils and materials; drums and waste mixtures containing liquids or other specified hazardous wastes subject to land disposal prohibitions will be disposed by incineration at an offsite commercial hazardous waste incineration facility operating under an appropriate RCRA permit or interim status; drums and waste mixtures containing hazardous substances suitable for land disposal will be disposed of at an offsite commercial hazardous waste land disposal facility operating under an appropriate RCRA permit or interim status or, if cost-effective, at an incineration facility as described above; non-hazardous material and debris may be disposed of at a permitted sanitary landfill. For both dioxin and non-dioxin remedy components, site restoration activities will include backfill, regrading and seeding where appropriate. The estimated present worth cost for both remedial components is $20,200,000.

United States
Environmental Protection
Agency

Office of
Emergency and
Remedial Response

EPA/ROD/R07-86/006
September1986

PB87-189759

EPA

Superfund Record of Decision:

Ellisville Site Area, MO

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION VII
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KANSAS CITY, KANSAS 66101

SEP 29 1986

MEMORANDUM

SUBJECT: Approval of Recommended Alternative
Ellisville Area Site
Bliss and Contiguous Properties

FROM: David A. Wagoner
Director, Waste Management Division

David A. Wagoner

TO: Morris Kay
Regional Administrator

On July 8, 1986, you were delegated the authority to select the remedial action for the Ellisville Area site. I recommend that you approve the recommended alternatives and sign the attached Record of Decision.

The Remedial Investigation conducted between December 1982 and February 1983 identified the following hazardous waste problems: buried drums, tanks and other debris; buried uncontainerized hazardous wastes; contaminated soils and sediments; and soils and dust contaminated with 2,3,7,8-TCDD. The recommended alternative for the dioxin-contaminated soil and material is interim onsite storage in a building-enclosed container storage facility. Interim onsite storage is recommended as an operable unit of remedial action. Final remedy for the dioxin contamination has not yet been selected. The recommended alternative for both buried drums and uncontainerized hazardous wastes is offsite disposal at a RCRA permitted or interim status facility.

The remedial investigation and feasibility study reports and the recommended alternatives were presented to the community during a public comment period and at a public meeting on March 26, 1986. Comments received during the public participation process demonstrated a general consensus on the recommended alternatives. Major concerns raised by the public included the need to restrict access to the site, and to expedite cleanup activities at the site.

Our development and selection of the recommended alternatives included the assistance of and coordination with Regional Counsel, CDC, Environmental Services Division, RCRA Branch, Public Affairs, Congressional and Intergovernmental Liaison, Office of Ground Water Protection, and the Air Branch. The Missouri Department of Natural Resources has concurred on the recommended alternatives.

Attachment

Record of Decision
Remedial Alternative Selection

SITE

Ellisville Area Site: Bliss and Contiguous Properties
St. Louis County, Missouri.

DOCUMENTS REVIEWED

I am basing my decision primarily on the following documents describing the analysis of cost-effectiveness of remedial alternatives for the Bliss and Contiguous Properties at the Ellisville Area site.

- Onsite Storage Focused Feasibility Study, Bliss and Contiguous Properties, Ellisville, Missouri; February 1986.
- Remedial Feasibility Study, Ellisville Hazardous Waste Disposal Site, Ellisville, Missouri; September 28, 1983.
- Remedial Investigation, Ellisville Hazardous Waste Disposal Site, Ellisville, Missouri; September 21, 1983.
- Identification of Alternatives, Ellisville Hazardous Waste Disposal Site, Ellisville, Missouri; November 12, 1982.
- Description of Current Situation, Ellisville Hazardous Waste Disposal Site, Ellisville, Missouri; August 30, 1982.
- Summary of Remedial Alternative Selection.
- Recommendation by the Missouri Department of Natural Resources.
- Memorandum from ATSDR/CDC to EPA regarding health assessment.
- Staff summaries and recommendations.
- Responsiveness Summary.

DESCRIPTION OF SELECTED REMEDY

The selected remedy for the operable unit for the 2,3,7,8-TCDD contaminated soils and materials includes the following major components:

- Excavation and containerization in semi-bulk sacks of 2,3,7,8-TCDD contaminated soils and material exceeding one part per billion (ppb).

- Interim onsite storage of the containerized wastes in a metal building enclosure.

- Operation and maintenance requirements to ensure continued effectiveness of the remedy will include maintenance of the security system, maintenance of site runon/runoff controls and ground water sampling and analysis.

The selected remedy for buried drums and non-2,3,7,8-TCDD hazardous waste mixtures includes the following major components:

- Excavation, sampling, and overpacking of buried drums.

- Excavation of uncontainerized hazardous wastes and contaminated soils and materials.

- Drums and waste mixtures containing liquids or other specified hazardous wastes subject to land disposal prohibitions will be disposed by incineration at an offsite commercial hazardous waste incineration facility operating under an appropriate RCRA permit or interim status.

- Drums and waste mixtures containing hazardous substances suitable for land disposal will be disposed of at an offsite commercial hazardous waste land disposal facility operating under an appropriate RCRA permit or interim status or, if cost-effective, at an incineration facility as described above.

- Non-hazardous material and debris may be disposed of at a permitted sanitary landfill.

For both remedies described above, site restoration activities will include backfill, regrading and seeding where appropriate.

DECLARATIONS

Consistent with the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) and the National Contingency Plan (40 CFR Part 300), I have determined that the remedies described above for the Bliss and Contiguous Properties are cost-effective and provide adequate protection of public health, welfare and the environment. Interim onsite storage of dioxin-contaminated soils and materials as an operable unit of remedial action is consistent with a permanent remedy. The State of Missouri has been consulted and agrees with the approved remedies. In addition, the action will require future operation and maintenance activities to ensure the continued effectiveness of the remedy. These activities will be considered part of the approved action and eligible for Trust Fund monies for a period of one year after the completion of construction.

I have also determined that the action being taken is appropriate, when balanced against the availability of Trust Fund monies for use at other sites. In addition, the offsite transport, destruction, treatment, or secure disposition of buried wastes and contaminated soils are more cost-effective than other remedial actions and are necessary to protect public health, welfare or the environment.

The State or EPA will undertake an additional feasibility study to evaluate final remedial action for the dioxin wastes. A Record of Decision will be prepared for approval of the future remedial action.

9-29-86
Date

Morris Kay
Morris Kay
Regional Administrator
Region VII, EPA

V

SUMMARY OF REMEDIAL ALTERNATIVE SELECTION

Ellisville Area Site

Bliss and Contiguous Properties

U.S. Environmental Protection Agency
Region VII
September 29, 1986

SUMMARY OF REMEDIAL ALTERNATIVE SELECTION

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2	Site Map
3	Summary of Sample Results from Early Investigations
4	Sampling Locations
5	Summary of Waste Problems
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SUMMARY OF REMEDIAL ALTERNATIVE SELECTION

Ellisville Area Site: Bliss and Contiguous Properties

St. Louis County, Missouri

SITE LOCATION AND DESCRIPTION

The Bliss and Contiguous Properties site is located in west St. Louis County, Missouri, in the Northwest 1/4 of Section 32, Township 45 North, Range 4 East. The site, adjacent to the western corporate boundary of the City of Ellisville, is approximately 20 miles west of downtown St. Louis (Attachment 1a & 1b). The site is comprised of the 11.56-acre Jerry Russell Bliss property (hereinafter referred to as "the Bliss property") located at 149 Strecker Road, and four contiguous properties: the Dubman and Weingart property to the east; the Primm property to the west; the Wade and Mercantile Trust Company property to the northwest; and the Russell, Evelyn and Jerry Russell Bliss property to the south (Attachment 2).

Land use in the site vicinity is a mixture of residential, rural and recreational. The area around the site is rapidly being developed as a residential community. Residential areas lie just to the north, east and south, with small rural properties to the west. A subdivision north of the Mid-America Arena overlooks the site. Adjacent to the subdivision is Quail Woods Park with a bike path less than 100 feet from a known fill area on the Dubman property. The population within a one-mile radius of the site is approximately 1,000. Within a three-mile radius, the population includes about 5,000 people.

The developed portion of the site lies in the central leg of a relatively flat "Y" shaped valley with hillside slopes which vary from 25 to 50 percent. The developed portion consists of four general areas: the Mid-America Arena and parking area, the riding ring area, the northeast fill area, and the northwest fill area. Structures onsite include two occupied residences, house trailers, a large indoor horse arena and stables, barns, garages and silos. The site is located in an upland area underlain by limestone bedrock which exhibits high water permeability along solution-enlarged joints. A tributary of Caulks Creek drains the property to the northwest. Caulks Creek is a tributary of Bonhomme Creek, which enters the Missouri River about one mile upstream of a City of St. Louis waterworks intake. Generally, there is ground water recharge on and adjacent to the site. The site is not in a designated floodplain, but flooding of the creek draining the site is likely during periods of heavy rains due to rapid runoff.

The Bliss property consists primarily of alluvial flat and colluvial slopes. Earth grading has created relatively flat areas and altered drainage. The surface is underlain by about three to ten feet of silty clay. Soils on the Bliss property are reported to have moderate permeability. The depth to bedrock is about 10 to 15 feet. Based on information for wells in the Bliss property vicinity, the ground water table elevation is estimated to be about 560 feet. The elevation range for the Bliss property is from 630 feet on the north to about 710 feet on the south.

SITE HISTORY

During the 1960s and 1970s. Russell Bliss owned and operated the Bliss Waste Oil Company, an unincorporated business engaged in the transportation and disposal of waste oil products, industrial wastes and chemical wastes. The company's headquarters and operating facilities were located at the site, then owned by Russell and Evelyn Bliss. Resulting from a report of past dumping activities on the Bliss and contiguous properties, the Missouri Department of Natural Resources (MDNR) and the Environmental Protection Agency (EPA) conducted an onsite investigation on September 16 and 17, 1980. Positive responses were recorded with a metal detector over areas of disturbed soil and probes by a metal rod indicated solid objects beneath the surface. Composite soil samples and water samples revealed the presence of hazardous wastes.

Following the site investigation. affidavits were obtained from two individuals who worked on the Bliss property. The affidavits verified earlier reports that pits had been dug and used for industrial waste disposal, drums of waste had been buried at the site, and liquid wastes had been applied on the ground. The types of wastes were reported to include solvents, oils, pesticides, and can coating materials. An investigation by MDNR in June 1981, which consisted of excavating exploratory trenches, confirmed the presence of buried drums containing hazardous wastes and provided evidence that liquid wastes had been poured into pits and had been applied onto the ground surface. A summary of sample analysis results from the 1980 and 1981 investigations is provided in Attachment 3. This summary includes a sample result of 150 parts per billion (ppb) of 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD or dioxin) detected in a soil sample obtained by the Centers for Disease Control (CDC) in 1974.

The investigation of the Bliss and Contiguous Properties site was conducted in conjuction with similar investigations of Bliss dumping activities at the Jean Callahan property and the Rosalie Investment Company property. All three "sites," located in the immediate area. were considered as one site and identified as the Ellisville Area site.

In October 1981, EPA announced that the Ellisville Area site was listed on the National Priorities List. A cooperative agreement was awarded to the State of Missouri in March 1982 to undertake a remedial investigation/feasibility study (RI/FS) and to implement appropriate remedial actions. OH Materials, under contract to MDNR, conducted a geophysical survey on the site in June 1982 which identified several suspected waste disposal locations. Between December 1982 and February 1983, a remedial investigation was conducted. By September 1983, a feasibility study was completed. In July 1984, a focused feasibility study (FFS) was initiated to develop and evaluate remedial alternatives for interim onsite storage of dioxin-contaminated soil. The FFS was completed in February 1986. In August 1985. MDNR constructed a diversion dike to reroute runoff water. which flowed through a fill area on the Wade property, during periods of heavy precipitation. In April 1986. MDNR erected a 450-foot fence along a bike path in Quail Woods Park to limit access to a fill area on the Dubman property. On July 8, 1986, the Regional Administrator was delegated remedy selection authority for the site.

CURRENT SITE STATUS

The remedial investigation was conducted by Black and Veatch under contract to EPA between December 1982 and February 1983. A site reconnaissance was first conducted on the Bliss and contiguous properties on December 20 and 22, 1982, to evaluate site air quality and radioactivity, to observe and photograph site conditions and drainage. and to identify sampling locations. An organic vapor analyzer (OVA) was used to determine organic vapor concentrations in the ambient air at the site. No organic vapor levels above background concentrations were detected. A Geiger-Muller counter was used to identify the presence of near-surface radioactive materials on the site. No radiation levels above background were observed.

Following the site reconnaissance. three geophysical surveys were conducted using a terrain conductivity meter, a magnetometer, and a metal detector. Seventeen suspect waste disposal locations were identified. The presence of buried metallic objects was evaluated at thirteen of the seventeen locations.

A soil sampling program was performed which included power borings made by a drill rig and hand auger borings. Borings were conducted outside and within the perimeter of the suspect waste disposal locations. The locations of sample areas and borings are presented in Attachment 4. A total of 76 soil samples were obtained. In addition to soil samples, three surface sediment samples were obtained from creek channel "A." Three surface water samples were also obtained from creek channel "A." Three ground water samples were obtained from soil borings at three of the seventeen disposal locations.

Soil and dust samples were also obtained from inside the Mid-America Arena located on the Bliss property. The arena had been used for horse shows, indoor horse riding, and as a garage for the waste oil tank trucks of the Bliss Waste Oil Company.

Air quality monitoring was conducted during the sampling program to assess the air quality in work areas and to obtain data to evaluate the effect of remedial measures involving soil excavation on the ambient air quality. This monitoring was conducted using an OVA and organic vapor monitor badges. At the completion of the site investigation. several badges were selected for chemical analysis. Badges were selected based on the organic vapor concentrations observed during sampling using the OVA and the spatial distribution of the sample collection points. The air sample concentrations for priority pollutant compounds, non-priority pollutant compounds, and tentatively identified compounds were less than Occupational Safety and Health Administation permissible exposure limits.

In summary, the RI identified the following general hazardous waste related problems: 1) buried drums, tanks, and other debris 2) buried uncontainerized hazardous wastes. 3) contaminated soils and sediments; and 4) soils and dust contaminated with 2.3.7.8-TCDD (Attachment 5).

Ten of the suspected waste disposal locations had positive metal detector readings, indicating the presence of buried metals and the possibility of buried drums. At five locations (ELL-41, ELL-43, ELL-45, ELL-46 and ELL-48) buried drums exposed in creek channels and buried drums or pieces of buried drums exposed on the surface were observed.

Boring log information and analytical results indicate the presence of buried uncontainerized hazardous wastes at five locations (ELL-41, ELL-44, ELL-48, ELL-50 and ELL-51). Priority pollutant and other organic compounds detected at high concentrations include toluene, o-xylene, m-xylene, naphthalene, 4-methyl-2-pentanone and trichloroethylene. The analytical data indicates the 0-5 foot depth range as the most contaminated, with contamination detected to depths of at least 20 feet. Special analysis for 2,3,7,8-TCDD was performed on 72 of the 76 soil samples. The 2,3,7,8-TCDD was detected in samples collected from 7 of the 17 suspected waste disposal locations. The highest concentration was 120 ppb at ELL-64. A concentration of 4.8 ppb was detected in a sample of dust collected from the Mid-America Arena.

No priority pollutant and non-priority pollutant organic compounds were detected in water samples collected at ELL-71 and ELL-72. Trichloroethane was detected in the water sample collected at ELL-73, but at a concentration less than the EPA water quality criteria for freshwater aquatic life and human health protection. Several organic compounds were detected in sediment samples collected at ELL-71, ELL-72 and ELL-73. Ground water was present in sufficient quantities to sample in borings around three disposal locations (ELL-45, ELL-51 and ELL-52). Three priority pollutants were detected but their actual presence is suspect due to their use in decontaminating sampling equipment or their presence in field blanks.

The offsite investigation to evaluate potential offsite migration of wastes and to assess their potential impacts on human health consisted of the sampling of four nearby domestic drinking water wells and the collection of surface water samples from five locations on Caulks Creek. Sample locations are identified in Attachment 6.

No organic compounds and only three metals (boron, iron and zinc) were detected in the ground water samples from the four drinking water wells. Only zinc is a priority pollutant; iron and zinc are covered by the National Secondary Drinking Water Regulation. The concentrations of both were less than the secondary maximum contaminant levels.

Six priority pollutant organic compounds were detected in the samples of water collected from Caulks Creek. Four of these, dibutyl phthalate, methylene chloride, tetrachloroethylene and lindane, were detected in the water sample collected upstream of the Ellisville site; in the downstream samples, the concentrations of these compounds were essentially the same as in the upstream sample or these compounds were not detected. Aldrin and heptachlor were detected in the sample collected at ELL-96, but not detected in the other upstream or downstream samples. Concentrations of lindane were in excess of the EPA 24-hour average criterion to protect freshwater aquatic life. The concentration of heptachlor in the sample collected at ELL-96 exceeded the EPA 24-hour average criterion for freshwater aquatic life protection. while the concentration of dibutyl phthalate exceeded the EPA criterion for chronic toxicity to freshwater aquatic life. However. these concentrations were less than the EPA maximum or acute toxicity criteria.

The RI concluded that the analytical data indicates that the Ellisville site is not contaminating nearby drinking water wells and Caulks Creek. The data does indicate that surface water transport of contamination has occurred, but the migration has apparently been limited to onsite. Ground water transport of contamination was not indicated by the data.

Exact quantities of waste material on the site are not known. Based on information obtained from the RI. the FS established a working estimate of 1500 buried drums, 10,000 cubic yards of waste mixtures, and 16,000 cubic yards of TCDD-contaminated soil. The FS estimate for the volume of dioxin-contaminated soils was based on areas and depths of the waste disposal locations where dioxin was detected at concentrations greater than 1 ppb. Because the FS volume estimate did not consider the extent of contamination outside of the immediate waste disposal areas or the potential for contamination at locations not sampled (Bliss driveway, road to the arena and parking areas, areas between disposal locations), EPA calculated additional volume estimates to take into consideration potentially contaminated areas. Based on these calculations, EPA established an estimate of 20,000 yd^3 of dioxin-contaminated soil.

The Bliss and Contiguous Properties site poses a serious threat to public health, welfare and the environment due to the large number and high concentrations of toxic chemicals disposed of on the site, and local geological and topographical features which increase the potential for migration offsite via surface and ground water.

The RI soil sampling conducted at the seventeen waste disposal locations identified over 140 compounds which included 26 priority pollutant compounds, 5 non-priority pollutant compounds, and 113 tentatively identified organic compounds (Attachment 7). A review of the "Handbook of Toxic and Hazardous Chemicals and Carcinogens" second edition by Marshall Sittig, and "Chemical, Physical, and Biological Properties of Compounds Present at Hazardous Waste Sites," an EPA reference document, identified many of the contaminants to be moderately to highly toxic. persistent, or mobile. Many of the contaminants are carcinogens, mutagens, and/or teratogens. Attachment 8 briefly summarizes properties and potential health effects for contaminants identified by ATSDR/CDC to be "principal contaminants" based on their high concentrations, toxicity, mobility, or persistence in the environment.

Geological and topographical features increase the potential for migration offsite via surface and ground water. The Ellisville Area site is underlain by a limestone bedrock unit known as the Burlington-Keokuk (B-K) Formation with a thickness of approximately 170 feet in the region. Due to solutioning and jointing which have occurred in the formation. it is considered a water-bearing formation and is used as a potable water source. This type of geologic formation is very susceptible, however, to contamination because of the cracks and solution channels in the bedrock. It was estimated in 1982 that there were about 70 wells in the Caulks Creek watershed. Some wells utilize the B-K formation or the lower Fern Glen formation. Ground water flow is believed to be primarily along and controlled by the solution-enlarged joints and can only be predicted on a general basis as primarily in the down dip (northeast) direction of the rock units. ATSDR/CDC concluded that ground water contamination is a definite health risk due to the possibility of rapid transport of contaminants through the fractured limestone of the area.

A tributary of Caulks Creek drains the site to the northwest. The portion of the tributary on and upstream of the northeast fill area has been reported to be a gaining stream. Seeps and saturated soils are reportedly in that portion of the tributary. A portion of the tributary on and downstream of the northwest fill area is reported to be a losing stream. This flow loss recharges ground water supplies in the general region of Caulks Creek and Lewis Spring. Contaminanted surface water, therefore, has a direct pathway to the ground water.

Drums, uncontainerized hazardous wastes, and dioxin-contaminated material have been identified near or in surface water drainage ways on the site. Contaminants in solution or suspension can be transported to Caulks Creek and may eventually enter the Missouri River via surface water. ATSDR/CDC concluded that surface water contamination is also a health risk.

A potential health risk exists through airborne migration of contaminated fugitive dusts or organic vapors. Several of the hazardous substances detected have serious health effects with chronic exposure through inhalation. During the summer months when warm weather maximizes volatilization, the prevailing winds are from the site toward the residential area to the north. ATSDR/CDC has concluded that this is a public health risk during activities which generate large amounts of dust.

The potential for direct contact also exists at the site. Residential areas lie to the north, east, and south. Several portions of the Bliss and the contiguous properties are not fenced or posted with warnings of hazardous conditions. Individuals currently live and/or work at the Bliss property. In September 1983, the Centers for Disease Control issued a Health Advisory which stated that, "Due to the levels of dioxin contamination found in the arena area and in the arena parking lot, persons using this facility or residing on this property should be considered to be at risk of developing adverse health effects from dioxin exposure if they continue to use this facility as it now exists." Drum lids, solidified industrial waste, and other debris from the site are reportedly in the stream channel downgrade of the Bliss property. Due to the close proximity of residential development to the site, the potential of human contact with toxic substances is increased.

ATSDR/CDC concluded that the major public health threats at this site are direct contact with contaminants or contaminated soil and contamination of ground water used for drinking. Exposure to airborne contaminants is a concern during remedial action.

ENFORCEMENT

The potentially responsible parties for this site include the present and past owners/operators and generators of the wastes disposed of at the site. On December 22, 1981, notice letters were sent to the PRPs identified as of that date offering them an opportunity to develop and implement a remedial action plan for the removal or containment of the hazardous substances at the site. The PRPs declined to undertake the necessary response.

On November 14, 1984, an administrative order was issued, pursuant to Section 106 of CERCLA, to subsequently identified generators of the dioxin wastes disposed of at the site. These PRPs, who had previously filed Chapter 11 petitions in bankruptcy, initiated an adversary proceeding in bankruptcy court challenging the order. On April 8, 1985, in settlement of the adversary proceeding, the government entered into a stipulation which provided, inter alia, that no further civil or administrative action would be taken in connection with the November 14 administrative order and that all enforcement dates identified in the order would be suspended so that the beginning date for calculation of enforcement dates will not be prior to September 16, 1985. This stipulation has been extended and remains in force as of the date of this Record of Decision.

The State of Missouri filed a complaint on June 20, 1984, against Russell Martin Bliss, Evelyn Bliss, Jerry Bliss, and Jerry-Russell Bliss, Inc., as defendants. The filed case is a civil action brought under Section 107(a) of CERCLA, 42 USC §9607(a), for reimbursement of costs and expenses incurred by the state in response to a release or threat of release of hazardous substances, pollutants, and contaminants at the Bliss site, and for a declaratory judgment respecting the liability of defendants for costs to be incurred in the future by the state at the site. The state also requested that a conveyance in fraud of creditors be set aside and equitable liens be imposed on a portion of the real property comprising the site.

ALTERNATIVES EVALUATION

At the conclusion of the RI, a feasibility study was initiated. The objectives of the FS included the identification of remedial action objectives, the identification of remedial action alternatives and the selection of the alternative for implementation at the site. To facilitate consideration of remedial actions, contamination at the site was classified into four groups: 1) wastes contained in buried drums and tanks· 2) waste mixtures (includes uncontainerized hazardous wastes and contaminated soils and debris); 3) dioxin-contaminated soil and 4) uncontaminated soil.

Remedial action objectives identified for wastes in drums were to contain the wastes within the subsurface materials at their present locations or to remove and dispose of the wastes in an acceptable manner. For waste mixtures, objectives identified were to contain the pollutants within the surface or subsurface materials in their present locations, reduce the concentration of pollutants in the surface and subsurface materials or remove and dispose of the contaminated materials in an acceptable manner. Objectives for dioxin-contaminated soil were to contain the dioxin in the surface or subsurface materials in their present locations, or remove and dispose of the contaminated materials in an acceptable manner. For uncontaminated soil, the objective was to prevent or minimize the possibility of contaminating presently uncontaminated soil.

The FS, supplemented by additional discussion in this document, developed, screened, and evaluated remedial technologies and alternatives in accordance with Subpart F of the National Contingency Plan (NCP), 40 CFR Part 300. Remedial technologies presented in Section 300.70 and pertinent to the remedial action objectives were first identified (Attachment 9). The technologies identified as appropriate for the site were incorporated into separate remedial alternatives for the buried drums, waste mixtures, and dioxin-contaminated material.

As specified in Section 300.68(f), at least one remedial alternative was developed in each of the following categories: (i) Alternatives for treatment or disposal at an offsite facility, as appropriate; (ii) Alternatives that attain applicable or relevant and appropriate Federal public health and environmental requirements; (iii) As appropriate, alternatives that exceed applicable or relevant and appropriate Federal public health and environmental requirements; (iv) As appropriate, alternatives that do not attain applicable or relevant and appropriate Federal public health and environmental requirements but will reduce the likelihood of present or future threat from the hazardous substances and that provide significant protection to public health and welfare and the environment. This must include an alternative that closely approaches the level of protection provided by the applicable or relevant and appropriate requirements; (iv) No action alternative. Attachment 10 identifies the alternative developed for each of the categories above.

The alternatives were combined for various degrees of cleanup and subjected to an initial screening, as required by Section 300.68(g), based on cost, significant adverse environmental effects, acceptable engineering practices and effectiveness. For a detailed development of the remedial alternatives, several assumptions and estimates were made regarding the extent of contamination. Based on early site investigations and the remedial investigation, the FS estimated that 1,500 drums are buried at the site. The total volume of waste mixtures was estimated to be about 10,000 cubic yards. The FS estimated the total volume of dioxin-contaminated soil to be about 16,000 cubic yards. (This estimate was later revised by EPA to be at least 20,000 cubic yards as discussed earlier.)

A detailed evaluation was conducted for each of the alternatives as required by Section 300.68(h). The criteria used to evaluate each alternative included cost, significant adverse environmental effects, adequate control or effectiveness, reliability, implementability, operation and maintenance requirements, safety and regulatory requirements, and public acceptance. A brief summary of each alternative is provided below. Attachment 11 presents tables of the evaluation criteria for the FS alternatives.

Buried Drums

1) BD-1 No Action. The buried drums will eventually corrode to the point that their contents are released and percolating wastes may transport contamination to the ground water. Erosion and subsidence could expose corroded drums, a direct contact concern as well as an air quality concern. Surface water would transport contamination. possibly into ground water in the segment of the creek that is a losing stream which drains the properties.

2) BD-2 In-situ Containment. A slurry wall of bentonite and soil would be constructed around all the waste burial locations northeast and northwest of MAA. Waste mixtures and contaminated soil would be excavated from other locations on the property and placed on a graded surface within the slurry wall. An impermeable cap would be constructed over the slurry wall enclosure. A surface water diversion system, creek relocation and channelization, and underdrains would be incorporated. Disturbed areas would be graded and reseeded. The containment area would be enclosed with a fence and monitoring wells would be installed. The probable cost is $2.1 million. The slurry wall, cap, and underdrainage system would divert surface and subsurface water from the contaminated solids. However, liquids leaking from buried containers would not be controlled and could migrate into the ground water.

3) BD-3 Treatment. Drums would be excavated, sampled, and stored. Treatability and pilot studies would be performed on samples of waste to determine the types of treatment different wastes are amenable to. The stored wastes would be treated, and the treatment residuals disposed of in an approved manner. The probable cost ranges from $980,000 to $1,200,000, depending upon the methods and costs of treatment. However, some or all of the wastes in buried drums may not be amenable to treatment.

4) BD-4 Onsite Disposal in a Secure Landfill. Landfill cells with double synthetic liner and a leachate collection and detection system would be constructed on the properties. The currently buried containerized wastes would be excavated and disposed of in the landfill. This option has two subalternatives. For the drum overpacking subalternative, excavated buried drums would be placed inside recovery drums and transported to the landfill cells. For the waste bulking subalternative, the wastes in excavated containers would be consolidated into bulk volumes according to compatibility. Bulk waste and crushed drums would be placed into landfill cells according to compatibility. For both subalternatives, drums containing waste not suitable for land disposal would be transported offsite to permitted facilities for disposal. After wastes are placed in the cells, an impermeable cap, a surface water diversion system, a fence, and monitoring wells would be installed. Disturbed areas would be graded and reseeded. The drum overpacking subalternative would cost $930,000 and the waste-bulking subalternative would cost $710,000. This alternative would have negative engineering and environmental aspects because of the geological and residential setting of the site.

5) BD-5 Offsite Disposal at Permitted Disposal Facilities. The buried

containerized wastes would be excavated and transported to permitted facilities for offsite disposal. Excavated waste could either be placed inside 85-gallon recovery drums or consolidated into compatible bulk volumes prior to disposal. The drums, bulk waste. and crushed drums would be transported to permitted disposal facilities according to the characteristics of their contents. Disturbed areas would be backfilled, graded, and reseeded. The drum overpacking subalternative would cost $710,000 and the waste-bulking subalternative would cost $540,000.

Waste Mixture

1) BWM-1 No Action. Percolating water and surface water would transport contamination from waste mixtures in the buried pits to the stream that drains the properties and/or to the ground water. Erosion and subsidence would present a direct contact concern as well as an air quality concern.

2) BWM-2 In-situ Containment. This is basically the same as described for buried drums. Alternative BD-2. The cost of containment for waste mixtures is included in the probable cost for the buried drum alternative.

3) BWM-3 Onsite Biological Treatment. A windrowing area with a gravel base and liner, a surface water diversion system, a leachate and runoff collection system, and a fence would be constructed on the properties. The excavated waste mixtures would be placed into windrows, inoculated with a microbiological preparation. and turned and reinoculated at regular intervals until analyses indicated adequate biodegradation. A treatability study is needed to determine if the waste mixtures are amenable to biological treatment and a pilot study would be required. Following treatment, the biodegraded waste mixtures would be placed back into excavated areas and disturbed areas would be graded and reseeded. The probable cost would be $1,100,000. This alternative involves a great amount of onsite disturbance with the potential for release of organic vapors to the air. It would be difficult to implement because the site does not have sufficient level space to construct a large enough windrowing area and leachate runoff holding basin to treat all the waste at one time.

4) BWM-4 Onsite Disposal in a Secure Landfill. This is similar to the alternative for buried drums, except that waste mixtures would be excavated and placed in the onsite landfill cells. The probable cost is $1,300,000.

5) BWM-5 Offsite Disposal at Permitted Disposal Facilities. This is similar to the waste-bulking subalternative for offsite disposal of buried drums, except that waste mixtures would be excavated and disposed of offsite. The probable cost is $1,100,000.

Dioxin-Contaminated Soil

1) BDCS-1 No Action. Dioxin. which is only slightly soluble in water and quite stable, will persist in the surface and subsurface soils

providing continued opportunities for direct contact. Erosion may transport dioxin-contaminated soil into the creek draining the properties. If dioxin is soluble in organic solvents present at the site, dioxin may eventually migrate into the ground water used for drinking water.

2) BDCS-2 In-situ Containment with Slurry Wall and Impervious Cap. Dioxin-contaminated soil would be enclosed by the in-situ containment system already described for drums and waste mixtures. The cost of this alternative is included with the costs for alternative BD-2 and BWM-2.

3) BDCS-3 Onsite Treatment by Solidification with Soil Cement after Removal of Drums and Waste Mixtures. Dioxin-contaminated soil, greater than 1 ppb, would be excavated from several locations and developed into soil cement and placed back into and around the excavated areas. The top 12 inches of soil and gravel in the area north and northeast of the Mid-America Arena would be developed into compacted soil-cement pavement covering the entire area. The pavement formed with in-situ soil would be covered with an additional 6 inches of soil cement developed from uncontaminated soil. This additional layer would isolate the dioxin-contaminated materials from the surface and eliminate the potential for direct contact with dioxin. Drainage channels would be provided. The cost would be about $1,000,000.

4) BDCS-4 Onsite Disposal in a Secure Landfill. The dioxin-contaminated soil and gravel would be excavated and disposed of in a secure landfill on the properties. This alternative has two subalternatives: below-grade monofill and an above-grade monofill. The construction for the below-grade monofill would be similar to that for alternative BWM-4. For the above-grade monofill, an earth embankment monofill cell with a double synthetic liner system and leachate collection and detection system would be constructed. After placement of dioxin-contaminated soil in the cell, a multi-layered impervious cover would be installed. Monitoring wells would be provided for both subalternatives. The cost for below-grade monofill subalternative would be $1.9 million and $2.8 million for the above-grade monofill.

5) BDCS-5 This is similar to BWM-5 except that dioxin-contaminated soil and gravel would be excavated and disposed of offsite. The probable cost is $1,700,000. An offsite storage subalternative was also developed. Dioxin-contaminated soil would be excavated, transported in bulk, and stored at the offsite facility. The cost for the offsite storage subalternative would be about $1,000,000.

Based on the detailed evaluation of each alternative, five program options were selected on the basis of environmental and public acceptability and lowest cost: Program A (BD-5, BWM-5, BDCS-5), Program B (BD-5, BWM-5, BDCS-5-storage subalternative), Program C (BD-5. BWM-5. BDCS-3), Program D (BD-5, BWM-3, BDCS-3), Program E (BD-5, BWM-2). Attachment 12 presents the five program options with costs. The FS recommended that either Program B or C be implemented because B was the most environmentally and publicly acceptable program that could be implemented for the site and C was the lowest probable cost program that could be implemented for the site which was environmentally and publicly acceptable.

The State of Missouri was in agreement with all recommended alternatives except for the recommendations for the dioxin-contaminated soils. The state. based on the findings and recommendations of the Governor's Missouri Dioxin Task Force, recommended the implementation of secure interim onsite storage of dioxin-contaminated soils. The task force had issued a final report of its findings and recommendations in October 1983. One of its recommendations was secure central storage of soil contaminated with dioxin until proven technology was available to assure a comprehensive and permanent solution to dioxin contamination with minimal risk to public health and the environment. At the time of the recommendation, no proven technology existed for the safe destruction of dioxin soils. Lacking a technology for large-scale destruction of dioxin-contaminated soil and a central storage facility, the State and EPA began to evaluate onsite interim storage alternatives for the Bliss site. Because the existing FS presented only a superficial analysis of onsite storage options, CH$_2$M Hill prepared a Focused Feasibility Study (FFS) to supplement the FS. The FFS, completed in February 1986, developed and evaluated remedial alternatives for interim onsite storage of dioxin-contaminated soils as an operable unit of remedial action for the site. Final remedial action for the dioxin-contaminated soils at the site has not been selected.

The interim storage alternatives discussed in the FFS were developed and evaluated according to the procedures specified in the NCP. Alternatives were assembled around four classes of RCRA containment (tank, enclosed wastepile, landfill and containers), and were comprised of several components: facility location. waste handling system, containment structure and leachate treatment system. Options were developed and screened for each component. Six interim storage alternatives/subalternatives were developed and evaluated in detail from the components which passed the initial screening. A seventh alternative, conversion of the Mid-America Arena into a storage facility, was eliminated due to its limited capacity, and because the arena occupied the most cost-effective location for construction of a new facility. A brief summary of each alternative is provided below.

1) Concrete Tank with Flexible Cover. The concrete tank storage alternative consists of a rectangular, open topped, reinforced concrete tank with sidewalls approximately 13 feet high. The concrete botton (base) of the tank is double lined and includes a leachate collection system and a leak detection system. Excavated wastes are stored in bulk. The flexible cover consists of a single synthetic liner with other layers of gravel, sand, and soil, and with erosion protection on the surface. The estimated cost for this alternative is $11.6 million.

2) Building-Enclosed Wastepile. The enclosed wastepile consists of bulk storage of soil in a widespan steel building. The base of the enclosure consists of a double liner and includes a leachate collection system and a leak detection system; the primary liner is supported by a concrete slab. The estimated cost for this alternative is $9.6 million.

3) Monofill with Flexible Cover. The monofill alternative consists of bulk storage of soil in an above-ground fill placed on a double-liner base as described for the enclosed wastepile. Two double-liner cover options

are considered. One option consists of one synthetic liner and one clay liner plus layers of gravel, sand, topsoil, and erosion protection on the top. The second cover option is similar except both liners are synthetic. The estimated cost for the composite and double-synthetic cover monofill alternatives are $11.0 million and $9.3 million, respectively.

4) Enclosed-Container Storage Facility. The container storage facility consists of 2.4 cubic yard (gross) semi-bulk sacks stacked four high in either a metal building enclosure or a synthetic membrane enclosure. The sack consists of an 8 mil polyethylene inner liner and an outer bag of woven polyethylene. The containment base consists of a single impervious liner over a concrete slab with a leachate collection system. The total design and implementation cost for the steel building enclosed subalternative is estimated to be $13.9 million and for the synthetic membrane enclosed facility is $13.3 million.

All six alternatives/subalternatives were developed in detail with respect to design, implementation and operation. Evaluation of the six alternatives/subalternatives was performed according to applicable technical, cost, environmental, and public health criteria. The advantages and disadvantages with respect to each of the assessment criteria are summarized in Attachment 13. Costs for each alternative are summarized in Attachment 14.

COMMUNITY RELATIONS

The Bliss site is one of three waste disposal areas designated as the Ellisville Area site. The other two areas, the Rosalie property and Callahan property, were the chief focus of previous community relations activities between 1981 and 1984. A series of press releases were issued about the Ellisville Area site from 1981 through 1984. A briefing was held for local officials on cleanup proposals for the Rosalie and Callahan portions on July 11, 1984, and a public hearing followed on August 9, 1984. Although these meetings were not directly related to the Bliss site, they did provide an opportunity for participants to learn about area hazardous substance problems.

On November 22, 1985, EPA and the Missouri Department of Natural Resources conducted a site tour and meeting for representatives of Congressman Young's Office and the Mayor of Ellisville. On March 14, 1986, a briefing was held to inform local officials and congressional representatives of future activities at the Bliss site. A press release was issued on March 17, 1986, announcing the availability of the feasibility studies for review at the Daniel Boone Branch of the St. Louis County Library in Ellisville and soliciting written comments on the cleanup proposals. On March 26, 1986, at 7:30 p.m., MDNR met with the Homeowners' Association in Wood Meadow Subdivision to discuss the site. A chief concern of homeowners was the proximity of the site to a bike trail in Quail Woods Park. Homeowners urged that this area be fenced to limit access of children to the area.

A public meeting was held on March 31, 1986, at the Parkway West High School in Ballwin, Missouri, for the purpose of allowing citizens and local elected officials to comment on the proposed cleanup alternatives. Attendees were also encouraged to send written comments to MDNR or EPA by April 14, 1986. MDNR's responsiveness summary for the public meeting, copies of comment letters received, and an overall project responsiveness summary which discusses the community's concerns and support for each alternative are provided in Attachment 15.

CONSISTENCY WITH OTHER ENVIRONMENTAL REQUIREMENTS

Section 105(3) of CERCLA provides that the NCP shall include "methods and criteria for determining the appropriate extent of removal, remedy, and other measures authorized by this Act." Subpart F of the NCP establishes methods and criteria for determining the appropriate extent of response. Section 300.68(i)(1) of Subpart F provides that the appropriate extent of remedy shall be determined by the lead agency's selection of a cost-effective remedial alternative that effectively mitigates and minimizes threats to and provides adequate protection of public health, welfare, and the environment. Except as provided in 300.68(i)(5), this will require selection of a remedy that attains or exceeds applicable or relevant and appropriate Federal public health and environmental requirements that have been identified for the specific site.

The remedial alternatives evaluated are source-control measures to prevent or minimize the migration of contamination. These actions include containment, treatment, onsite storage, onsite disposal, offsite transport, offsite storage, and offsite disposal. Federal requirements that are applicable or relevant and appropriate, and state and local standards to be considered include: Resource Conservation and Recovery Act (RCRA), Department of Transportation (DOT) Regulations on Transportation of Hazardous Materials, Intergovernmental Review of Federal Programs, National Pollutant Discharge Elimination System (NPDES) Permit Program, Clean Air Act, EPA Ground Water Protection Strategy, Occupational Safety and Health Act, Missouri Hazardous Waste Management Law, Missouri Clean Water Law and Missouri Air Quality Laws. The recommended alternatives for the Bliss and Contiguous Properties site will comply with the above Federal requirements. Major technical requirements are discussed below.

The interim storage alternatives developed in the FFS for dioxin-contaminated soils either meet or exceed federal and state requirements as described in RCRA 40 CFR Part 264, "Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities" and 10 CSR 25-7.0, "Rules Applicable to Owners/Operators of Hazardous Waste Facilities," respectively. The essential requirements of these regulations are double containment of wastes, leachate collection and leak detection systems, prevention of surface water runon and runoff, and prevention of wind dispersal of wastes. Leachate treatment is required before disposal of excess fluids that may have been in contact with dioxin-contaminated soils stored in the interim storage facility. The final effluent may require a NPDES permit prior to discharge. During final design, it may be concluded that a leachate treatment facility is unnecessary due to an extremely low probability of an accumulation of contaminated water (containerized wastes in a building enclosure).

The feasibility study alternatives for removing hazardous substances offsite (BD-5, BWM-5, BDCS-5) involve the application of the RCRA requirement that all hazardous wastes must be removed or decontaminated if closure of the facility as a land disposal facility is to be avoided (capping and other closure/post-closure measures). The RCRA interpretation of "all hazardous wastes" has been that hazardous constituents must be cleaned to background levels. CERCLA policy has established, however, that levels above background may be left without triggering RCRA requirements for capping and other closure and post-closure measures. For this site, a site-specific limited risk assessment approach will be used to determine acceptable levels greater than background. This approach will base the risk of exposure on a public health assessment issued by ATSDR/CDC.

CERCLA "Procedures for Planning and Implementing Off-Site Response Actions (May 6, 1985)," apply to the selection of an offsite waste management technology and facility. The Offsite Policy states that response actions which use treatment, reuse, or recycling of hazardous substances should be pursued over land disposal to the greatest extent practicable, consistent with CERCLA requirements for cost-effective remedial actions. The policy states that treatment, reuse, or recycling alternatives should not be screened out on the basis of cost alone unless that cost exceeds the cost of other alternatives by an order of magnitude, and does not provide substantially greater public health and environmental benefits. RCRA regulations will also influence the technological options for offsite treatment and disposal of hazardous substances. The regulations include a ban on the placement of bulk liquids or hazardous waste containing free liquids in any landfill after May 8, 1985. The regulations also establish a schedule for restricting the land disposal of all hazardous wastes. The FS alternatives for offsite disposal will comply with these restrictions and the offsite policy in identifying the offsite waste management technology to be employed.

The offsite disposal alternatives will comply with the Offsite Policy which requires the offsite facility to have an applicable RCRA permit or interim status specific to the wastes and storage, treatment, or disposal processes involved. A RCRA compliance investigation must have been performed at the facility within the preceeding six months to assess whether there are any significant violations or conditions affecting satisfactory compliance. The policy prohibits the use of a RCRA facility if it has significant RCRA violations or other environmental conditions that affect the satisfactory operation of the facility.

When transporting wastes offsite to a RCRA facility, the shipment will be packaged and manifested in accordance with the RCRA requirements. These activities will also comply with the DOT regulations for transportation of hazardous materials.

Construction and O&M activities will comply with OSHA requirements.

RECOMMENDED ALTERNATIVE

Section 300.68(i)(1) of the NCP specifies that the appropriate extent of remedy shall be determined by the lead agency's selection of a cost-effective remedial alternative that effectively mitigates and minimizes threats to and provides adequate protection of public health and welfare and the environment. Except as provided in 300.68(i)(5), this will require selection of a remedy that attains or exceeds applicable or relevant and appropriate federal public health and environmental requirements. As provided in 300.68(i)(2), cost, technology, reliability, administrative and other concerns, and their relevant effects on public health and welfare and the environment will be considered in selecting the appropriate extent of remedy.

In accordance with Section 300.68(i), EPA and the MDNR recommend interim onsite storage of dioxin-contaminated material in a building-enclosed container storage facility and offsite disposal of buried drums and uncontainerized hazardous wastes at a RCRA permitted or interim status facility. This recommendation is based on information provided by the RI. FS, and FFS reports, and comments received from the public, local officials, the Missouri Department of Health, and the Agency for Toxic Substances and Disease Registry (ATSDR)/Centers for Disease Control (CDC). MDNR's letter of recommendation is provided in Attachment 16.

Interim onsite storage of dioxin-contaminated soil in a building-enclosed container storage facility is recommended as an operable unit of remedial action for the site. Final remedial action for dioxin-contaminated soil has not been selected. Interim onsite storage is considered the only feasible remedy which will provide adequate protection of public health, welfare, and the environment. Containerized storage onsite has been recommended by the Missouri Department of Health and concurred on by ATSDR/CDC. Interim onsite storage is in agreement with the Final Report of the Governor's Missouri Dioxin Task Force which recommended secure central storage of soil contaminated with dioxin until proven technology was available to assure a comprehensive and permanent solution to dioxin contamination with minimal risk to public health and the environment. Excavation and interim onsite storage in a building-enclosed container storage facility has been successfully implemented at several other eastern Missouri sites. Finally, containerized storage was the preference of citizens providing comments on the project.

Large-scale thermal destruction of dioxin wastes at the site is not technologically feasible at this time. Pilot/demonstration projects that have successfully destroyed dioxin at other test locations are not able to efficiently handle the large volume of contaminated material at the site. Many thermal destruction technologies would be difficult to implement due to the site's location and physical setting. The site is in a rapidly developing residential area, with nearby residences located at elevations higher than the site.

The alternatives for dioxin-contaminated soil evaluated in the FS do not provide adequate protection of public health, welfare, and the environment, are not technically feasible (performance, reliability, constructability, safety) or would be opposed by the community. Alternative BDCS-1 (no action) would not remedy existing conditions that pose significant threats to public health and the environment. People who live or work on or adjacent to the site could be exposed to dioxin contamination by direct contact, fugitive dust emissions, and erosion of contaminated soils into surface water. Alternatives BDCS-2 (insitu containment). BDCS-3 (encapsulation and capping with soil cement) and BDCS-4 (onsite disposal in a secure landfill) do not achieve an adequate degree of protection to public health, welfare, and the environment and would probably be opposed by the community as long-term remedies. The reliability of the above alternatives is contigent upon the continued integrity of the containment or capping systems. The location, topography and geologic setting of the site and contaminated areas, however, would adversely affect the continued integrity of the above onsite technologies. A majority of the contaminated areas are situated in a valley with hillside slopes which vary from 25 to 50 percent. Heavy rains and rapid runoff flood the creeks which flow through the site and valley. In addition, the site is located in an area underlain by limestone bedrock which exhibits high water permeability along solution-enlarged joints. A portion of one creek is a losing stream at the downstream end of the northwest fill area. This geological setting provides little natural protection to ground water because a release of contamination to surface water may result in transport of contamination offsite or to ground water. Also, the site is located in a rapidly developing residential area. These onsite alternatives would probably be opposed by the community due to the long-term presence of hazardous wastes at the site requiring long-term monitoring, maintenance, site security, and institutional controls such as deed restrictions. Regarding offsite treatment, storage or disposal (BDCS-5), there are no commercial facilities in the country which are permitted to receive dioxin wastes.

Of the six interim onsite storage alternatives evaluated in the FFS, the building-enclosed container facility is recommended as the cost-effective alternative most protective of public health, welfare, and the environment. The advantages of containers over bulk handling and storage are that the containers minimize the potential for exposure during excavation and subsequent rehandling of soil. Containers are filled and sealed at the point of excavation and receive exterior decontamination at the edge of the contaminated area. Containers facilitate transportation to the storage facility. Exposure is minimized during placement in the storage facility. During storage, containers may be readily inspected and can be easily replaced if unexpected damage should occur. Containerized storage will require the least maintenance to ensure the system integrity, resulting in the lowest O&M costs during the storage period. Containerized storage will be most compatable with a final remedy by facilitating removal and minimizing health and safety risks. This will provide significant future cost savings over bulk handling and storage. The primary disadvantages of a container system are the initial capital costs and complex implementation. A large quantity of containers will be required and containerization will slow excavation. For container storage, semi-bulk sacks are the most feasible container option due primarily to their low cost per cubic yard relative to steel boxes, steel drums, fiber drums, and plastic drums.

Bags should also provide fewer logistical difficulties (light weight, less storage area prior to filling, etc.) than rigid containers.

A significant feature of the project is that the volume of dioxin-contaminated soils is not well defined. The building-enclosed container facility is the alternative most suitable to accommodate phased or segmental construction. Other storage alternatives would require significant time delays for expansion which would result in additional costs. The enclosed-container facility is also least susceptible to waste placement interruptions due to weather and will present the least potential for release of contamination to air or surface/ground water during initial placement of wastes and at removal. The building enclosure will have smooth/hard surfaces facilitating decontamination, salvage, and conversion to other uses at the end of the storage period. This facility has the second lowest cost for demolition. During predesign/design, components of the storage facility will be optimized through additional evaluation and detailed engineering. This may result in the use of alternative construction/materials such as an asphalt pad for a base as opposed to a concrete slab. Painting of the storage building in an earth-tone color will also be considered during design to minimize adverse impacts the structure may pose to aesthetics of the area.

Based on the CDC recommendation that TCDD concentrations not exceed 1 ppb in residential soils, soils with TCDD contamination greater than 1 ppb will be excavated and containerized in semi-bulk sacks. As previously discussed, the volume of soil which will require excavation has been estimated to be at least 20,000 yd^3. Predesign/design sampling will be required to better define the extent of TCDD contamination of the site, including contamination of onsite structures and residences.

Dioxin-contaminated areas identified during the RI and subsequent sampling efforts will be sectioned into approximately 5,000 square feet areas. Three 50-aliquot composite samples will be collected from each individual area following excavation of each lift. These samples will be analyzed and subjected to a statistical analysis to determine remaining TCDD concentrations, in the same manner being implemented at other Missouri dioxin sites. Excavation and sampling will continue until demonstrated at the 95 percent upper confidence level that TCDD concentrations in soil do not exceed 1 ppb. For non-soil materials unable to be decontaminated or stored in bags, other appropriate containers will be used such as drums, boxes, etc.

The recommended remedial alternative for both buried drums and waste mixtures is offsite disposal (BD-5 and BWM-5). The proposed removal and offsite disposal of non-dioxin wastes and contaminated materials was supported by local residents and officials during the public participation process. This recommended alternative was also supported by the Missouri Department of Health and concurred on by ATSDR/CDC. Offsite disposal is considered to be the only feasible remedy for this site which will provide adequate protection of public health, welfare, and the environment. The onsite alternatives developed in the FS for buried drums and waste mixtures do not provide adequate protection of public health, welfare, and the environment, are not technically feasible (performance, reliability, constructability, safety), have significant adverse environmental effects, would not meet applicable or relevant and appropriate federal public health and environmental requirements, and would probably be opposed by the community. Alternatives BD-1 and BWM-1 (no action) would not remedy existing conditions that pose significant threats to public health and the environment. Buried drums will eventually corrode and release contaminants. Erosion of the soil cover would expose leaking drums, uncontainerized hazardous wastes, and contaminated soils. This would increase the risk of exposure through direct contact, airborne migration of volatiles or contaminated dusts, erosion of wastes and contaminated soil to the surface water. Contaminants in solution of suspension could be transported through the ground water to water supply wells in the area. The location, topography, and geologic setting of the site and contaminated areas would adversely affect the continued integrity of the onsite technologies (insitu containment, onsite treatment, onsite disposal). Construction of the interim onsite storage facility severely restricts the area available for onsite remedies. The area necessary for implementation of BD-3 would not be available. A majority of the contaminated areas are situated in a valley with hillside slopes which vary from 25 to 50 percent. Heavy rains and rapid runoff flood the creeks which flow through the site and the valley. In addition, the site is located in an area underlain by limestone bedrock which exhibits high water permeability along solution-enlarged joints. A portion of one creek is a losing stream at the downstream end of the northwest fill area. This geological setting provides little natural protection to the ground water in the event of a release of contamination. Selection of any onsite alternative would probably be opposed by the community due to the long-term presence of hazardous wastes at the site requiring long-term monitoring, maintenance, security, and institutional controls such as deed restrictions. Based on these factors, offsite disposal is necessary to protect public health. welfare and the environment and, therefore, meet the requirements of CERCLA Section 101(24).

The RI soil sampling conducted at the waste disposal locations identified over 140 compounds which included 26 priority pollutant compounds, 5 non-priority pollutant compounds, and 113 tentatively identified organic compounds. The RI analytical data indicate contamination at a depth ranging from 0 to 20 feet, with the 0-5 foot depth range as the most contaminated. The highest concentration for each compound was identified from the RI data (attachment 7). Nearly two-thirds of the maximum concentration levels detected were in the 0-5 foot depth range. With the exception of two waste disposal locations, the RI data indicated that the concentration of any compound present at depths greater than 5 feet was less than 50 parts per million (ppm); for any priority pollutant the concentration was less than 30 ppm and the concentration of any principal contaminant was less than 10 ppm.

The FS estimated that approximately 10,000 yd^3 of non-dioxin hazardous waste mixtures and 1,500 drums will be excavated. This estimate was calculated on the basis of excavation to a depth of 10 feet at 8 disposal locations (41-47,51) and to 6 feet at 2 locations (48,50). The actual depth of contamination may differ significantly from these estimates. Contamination which poses a threat to public health and the environment may be at depths less than 10 feet or greater than 10 feet. Factors which make it extremely difficult to establish cleanup levels for contaminants or depths of excavation include: An extent of contamination (vertical and horizontal) which is not well defined; the length of time which has passed since RI sampling was conducted (about 4 years); the time period (1960s and '70s) and methods (dumping of containerized and uncontainerized hazardous wastes into excavated pits and natural drainage channels, spraying on the ground, etc.) of past disposal activities; the large number, volume and types of contaminants dumped; geological and topographical features which have contributed to erosion and subsidence problems; and the types of fill materials used.

ATSDR/CDC were not able to identify cleanup levels required to protect public health but agreed with the alternative to develop and implement an excavation and sampling plan, approved by ATSDR/CDC, to remove drums and non-dioxin waste mixtures from the site. In accordance with the excavation and sampling plan to be developed during remedial design, excavation to a specified initial depth will be conducted at the disposal locations. Soil samples will be collected from the perimeter and bottom of the excavations in order to determine contaminant levels which remain. Analytical results will be provided to ATSDR/CDC for an assessment of any public health threat due to remaining contaminants. If ATSDR/CDC determines that contaminant levels remaining onsite do not represent a threat to public health, then the excavations will be backfilled graded, and reseeded. If ATSDR/CDC recognizes a remaining threat to public health, additional excavation will be conducted. Soil sampling will again be performed and analytical results provided to ATSDR/CDC for assessment. This process will be repeated until ATSDR/CDC determines that a threat to public health no longer exists. As previously discussed, the 0-5 depth range is the most contaminated. Excavation is expected to be limited to this range, although volume and cost estimates are based on excavating to a depth of 10 feet.

Excavation of buried drums will proceed concurrently with excavation of waste mixtures. The contents of each buried drum will be sampled for screening and compatibility analysis. Each drum will be properly stored onsite in a secured drum holding area until receipt of analytical results. Drums and waste mixtures containing liquids or other specified non-dioxin hazardous substances subject to the RCRA land disposal prohibitions, will be disposed of by incineration at a commercial hazardous waste incineration facility operating under an appropriate RCRA permit or interim status. Drums and waste mixtures containing hazardous substances suitable for land disposal will be disposed of at a commercial hazardous waste land disposal facility operating under an appropriate RCRA permit or interim status or, if cost-effective, at an incineration facility as described above. Debris and drums containing non-hazardous material may be disposed of at a permitted sanitary landfill.

As previously discussed, the RI and FS reports were completed in 1983. The FS identified the probable cost of each alternative based on unit costs of other similar projects, costs experienced at the Callahan drum excavation, and quotes received from contractors and offsite commercial facilities. The probable cost for each alternative and recommended program is identified in Attachments 11 and 12.

Because the cost data referenced in the FS is several years old. the cost estimates for the FS recommended alternatives, BD-5 and BWM-5 (offsite disposal), were revised to reflect current remedial action costs.

Presented in Attachment 17 are the revised approximate costs for BD-5 and BWM-5. The revised costs are based upon current feasibility studies of sites similar in nature and on several remedial action costing manuals developed by EPA, including the "Remedial Action Costing Procedures Manual," and the "Handbook: Remedial Action of Waste Disposal Sites." Several assumptions based on similar projects were made in deriving the cost estimates. A distance of 800 miles from the site to a commercial waste management facility was assumed. This distance would include three facilities with the capability of solids handling and currently permitted to incinerate PCBs. This type of facility may be required given the present and future land disposal restrictions and the types of wastes present at the site. The longer haul distance should include several commercial land disposal facilities from which a RCRA permitted or interim status facility can be selected. Costs for transport, land disposal, and incineration were also identified on the basis of similar current projects.

OPERATION AND MAINTENANCE (O&M)

The recommended remedial action involves the offsite disposal of buried containerized wastes and waste mixtures and will require no O&M activities. For the dioxin-contaminated wastes, projected O&M activities to ensure continued effectiveness of the onsite interim storage facility include: maintenance of the security system, maintenance of site runon/runoff control, leachate sampling and analysis if necessary, and ground water sampling and analysis until the state determines it is no longer necessary. Costs for O&M activities are included in Attachment 14.

The MDNR is the state agency responsible for O&M. The state's funding mechanism is the Missouri Hazardous Waste Remedial Fund. The recommended level of EPA funding will be at ninety percent for a time period of one year after the completion of construction. The state will assume full responsibility for all future O&M, after a period of one year following construction, for the expected life of the interim storage.

SCHEDULE

Key milestones and dates for project implementation are identified below.

Milestone	Date (Months)
- Approve Remedial Action (Sign ROD)	X
- Award/Amend Cooperative Agreement for Remedial Design	X + 4
- Procure Design Contractor	X + 6
- Complete Design	X + 16
- Award/Amend Cooperative Agreement for Remedial Action	X + 17
- Procure Construction Contractor	X + 19
- Initiate Construction	X + 21
- Complete Construction	X + 34

FUTURE ACTIONS

The recommended alternative of removal and offsite treatment or land disposal of buried containerized wastes and non-dioxin hazardous waste mixtures will constitute a final action for these hazardous wastes. For the dioxin-contaminated wastes, O&M activities will be required to ensure continued effectiveness of the onsite interim storage facility. A final remedy will be required for the stored dioxin-contaminated material.

Attachment 1a

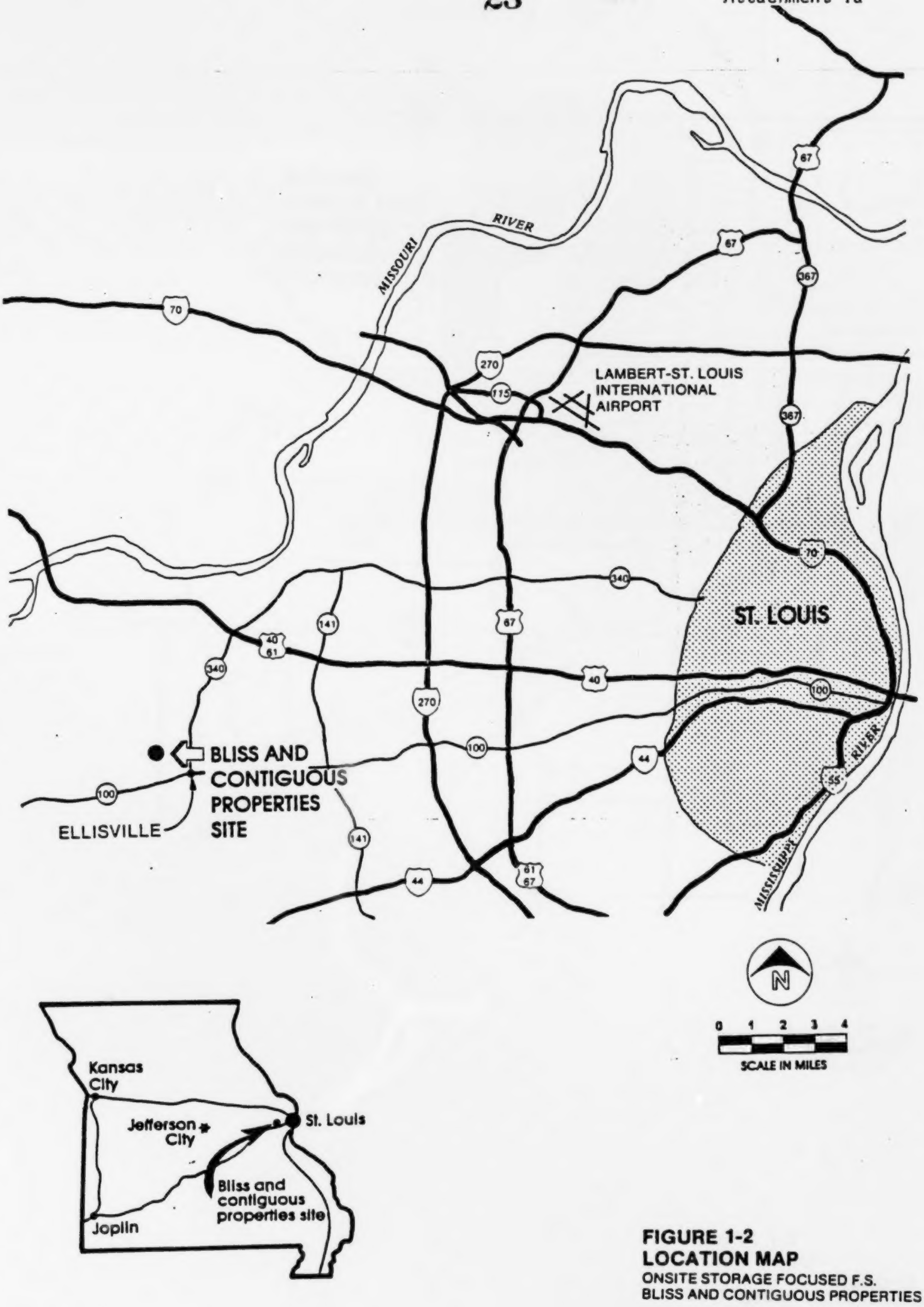
MISSOURI RIVER
70
67
367
270
115
LAMBERT-ST. LOUIS INTERNATIONAL AIRPORT
340
141
67
40 61
ST. LOUIS
40
100
270
BLISS AND CONTIGUOUS PROPERTIES SITE
100
ELLISVILLE
44
55
MISSISSIPPI RIVER
141
44
61 67
N
0 1 2 3 4
SCALE IN MILES
Kansas City
Jefferson City
St. Louis
Bliss and contiguous properties site
Joplin

FIGURE 1-2
LOCATION MAP
ONSITE STORAGE FOCUSED F.S.
BLISS AND CONTIGUOUS PROPERTIES

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Attachment 1b

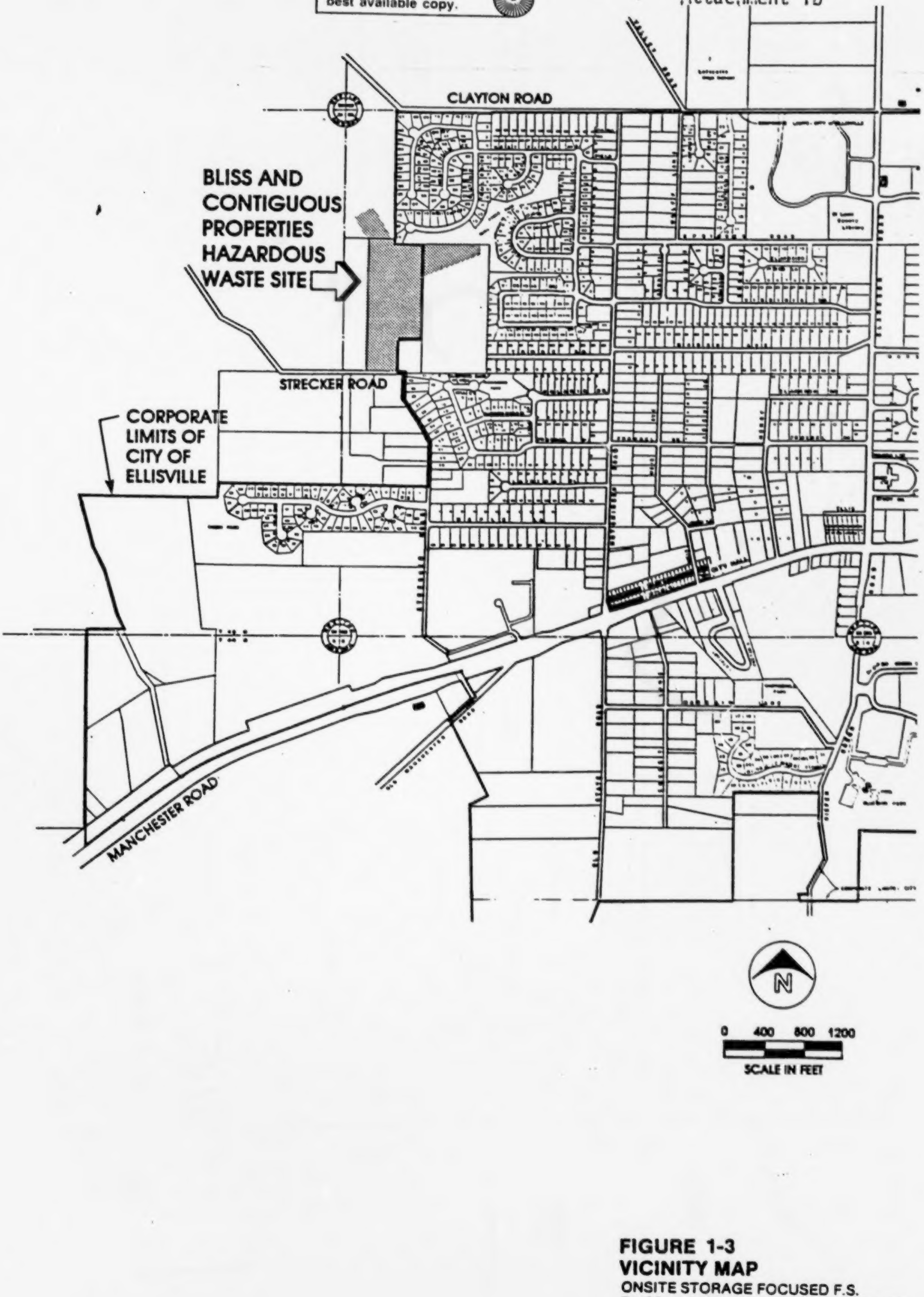

CLAYTON ROAD
BLISS AND CONTIGUOUS PROPERTIES HAZARDOUS WASTE SITE
STRECKER ROAD
CORPORATE LIMITS OF CITY OF ELLISVILLE
MANCHESTER ROAD
N
0
400
800
1200
SCALE IN FEET

FIGURE 1-3
VICINITY MAP
ONSITE STORAGE FOCUSED F.S.
BLISS AND CONTIGUOUS PROPERTIES

Attachment 2

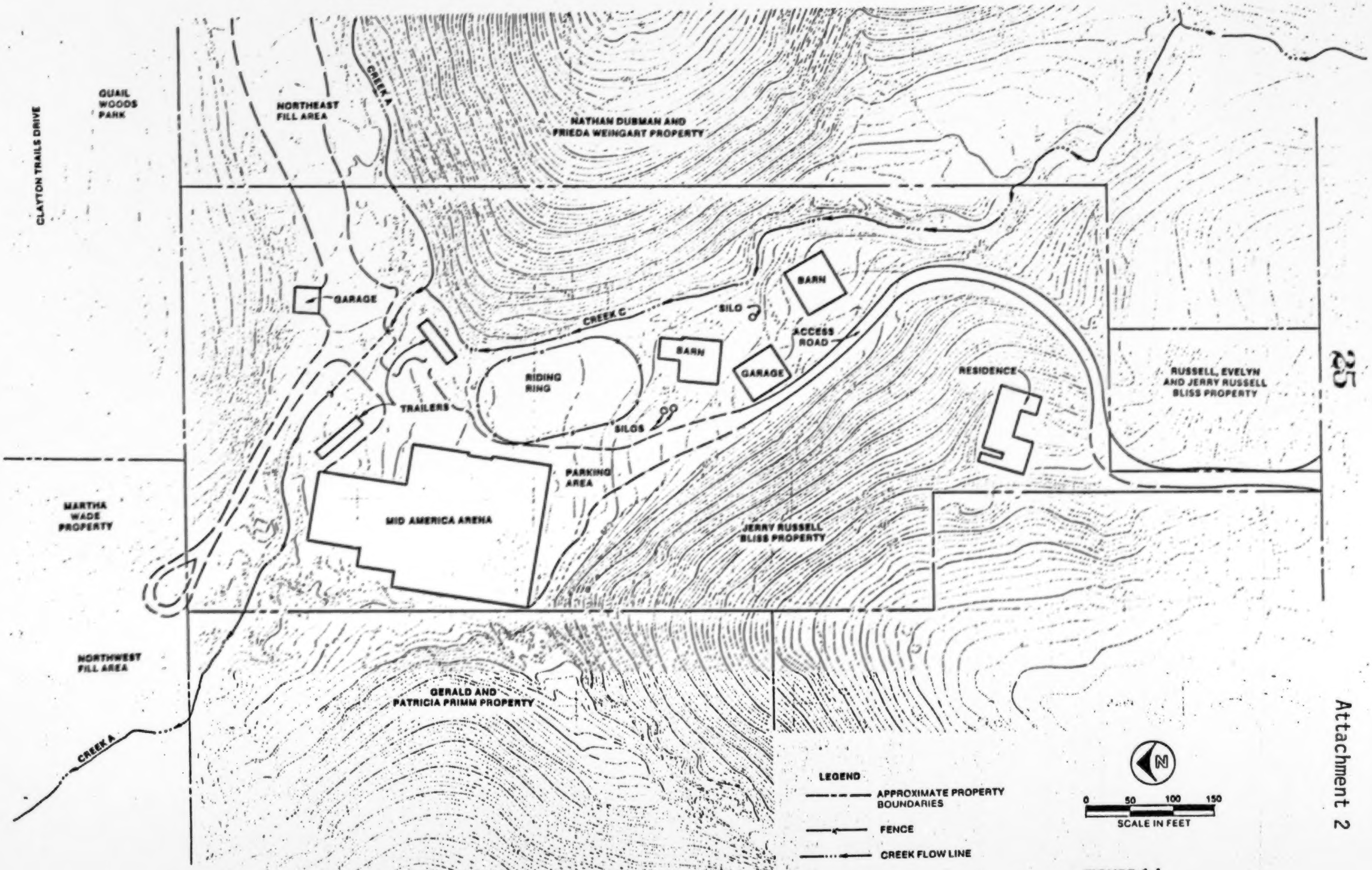

CLAYTON TRAILS DRIVE
QUAIL WOODS PARK
NORTHEAST FILL AREA
CREEK A
NATHAN DUBMAN AND FRIEDA WEINGART PROPERTY
GARAGE
CREEK C
SILO
BARN
ACCESS ROAD
BARN
GARAGE
RIDING RING
TRAILERS
SILOS
RESIDENCE
RUSSELL, EVELYN AND JERRY RUSSELL BLISS PROPERTY
PARKING AREA
MARTHA WADE PROPERTY
MID AMERICA ARENA
JERRY RUSSELL BLISS PROPERTY
NORTHWEST FILL AREA
GERALD AND PATRICIA PRIMM PROPERTY
CREEK A
LEGEND
APPROXIMATE PROPERTY BOUNDARIES
FENCE
CREEK FLOW LINE
N
0
50
100
150
SCALE IN FEET

FIGURE 1-4
SITE PLAN
ONSITE STORAGE FOCUSED F.S.
BLISS AND CONTIGUOUS PROPERTIES

Attachment 3

TABLE 9
BLISS AND CONTIGUOUS PROPERTIES SAMPLE ANALYSIS RESULTS SUMMARY

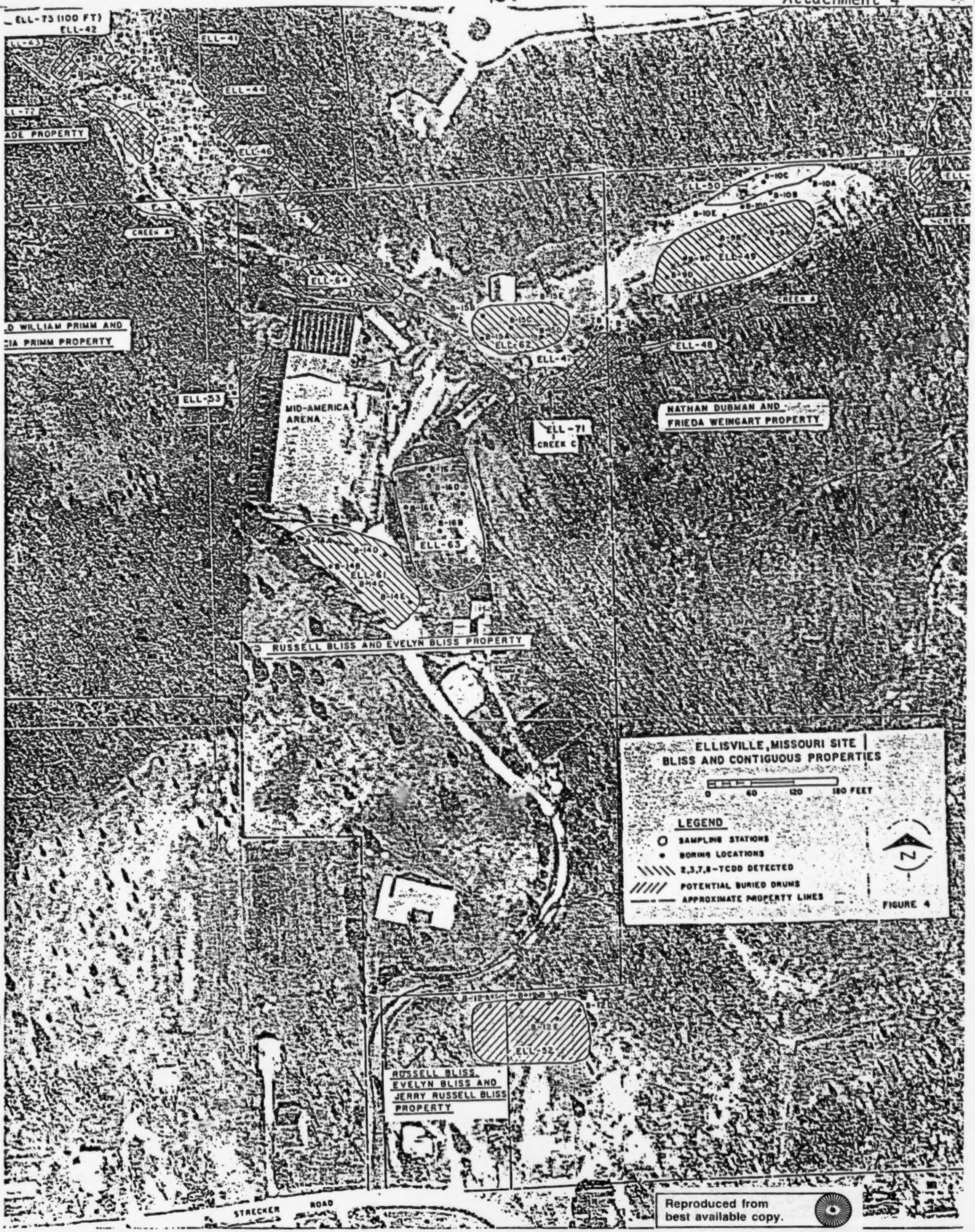
Identified Compounds	Maximum Concentration for 4 Drum Samples (6/3/81-6/4/81)	Sample of Liquid in Suspected Pit (6/4/81)	Maximum Concentration for 4 Soil Samples (8/12/74 and 9/17/80)	Maximum Concentration for 2 Water Samples (9/17/80)
	(ppm)	(ppm)	(ppm)	(ppb)
2,4-dimethylphenol	2.43	ND	NR	NR
pentachlorophenol	0.585	1.54	NR	NR
phenol	0.908	0.483	NR	NR
fluorathene	0.925	0.469	NR	2.7
napthalene	14.2	223	NR	NR
bis (2-ethylhexyl) phthalate	211	35	689	4.7*
butyl benzl phthalate	ND	ND	17.8	NR
di-n-butyl phthalate	1.4	1.33	4.82	4.8*
di-n-octyl phthalate	ND	ND	11	NR
diethyl phthalate	19.2	22.3	254	2.4*
chrysene/benzo (a) anthracene	ND	1.97	NR	NR
anthracene/phenanthrene	4.17	14.0	NR	7.5*
pyrene	0.491	2.35	33.5	2.8*
2,3,7,8-TCDD	ND	ND	0.15	NR
benzene	63	ND	NR	NR
1,1,1-trichloroethane	ND	9.0	NR	NR
chloroform	13.4	ND	NR	NR
1,2-trans-dichloroethylene	0.055	ND	NR	NR
ethylbenzene	1,830	13	NR	NR
methylene chloride	1,150	86	NR	NR
tetrachloroethylene	28.8	ND	NR	NR
toluene	387,000	153	NR	NR
trichloroethylene	ND	47	NR	NR
aldrin	ND	ND	NR	0.092*
dieldrin	ND	ND	0.0009	NR
endosulfan-alpha	ND	ND	0.0012	NR
BHC-alpha	ND	ND	NR	0.0156
BHC-gamma (lindane)	ND	ND	NR	0.464*
BHC-delta	0.195	ND	NR	NR
PCB-1254	ND	ND	NR	0.758*
PCB-1248	0.9	ND	46.7	0.656*
PCB-1260	0.25	ND	7.19	NR

ALL OTHER ORGANIC PRIORITY POLLUTANTS NOT REPORTED OR NOT DETECTED

NR - Not reported in available data. ND - Not detected

*Concentration greater than EPA water quality criteria for human health protection or freshwater aquatic life protection.

Draft 11/12/82



ELLISVILLE, MISSOURI SITE
BLISS AND CONTIGUOUS PROPERTIES

FIGURE 4

ELL-73 (100 FT)
ELL-42
ELL-43
ELL-41
ELL-44
ELL-45
ELL-46
ELL-72
ADE PROPERTY
CREEK A
ELL-50
ELL-49
ELL-64
ELL-62
ELL-47
ELL-48
CREEK A
D WILLIAM PRIMM AND
CIA PRIMM PROPERTY
ELL-53
MID-AMERICA ARENA
ELL-71
CREEK C
NATHAN DUBMAN AND
FRIEDA WEINGART PROPERTY
ELL-63
ELL-61
RUSSELL BLISS AND EVELYN BLISS PROPERTY
ELL-52
RUSSELL BLISS,
EVELYN BLISS AND
JERRY RUSSELL BLISS
PROPERTY
STRECKER ROAD
0
60
120
180 FEET
LEGEND
○ SAMPLING STATIONS
● BORING LOCATIONS
2,3,7,8-TCDD DETECTED
POTENTIAL BURIED DRUMS
APPROXIMATE PROPERTY LINES
N

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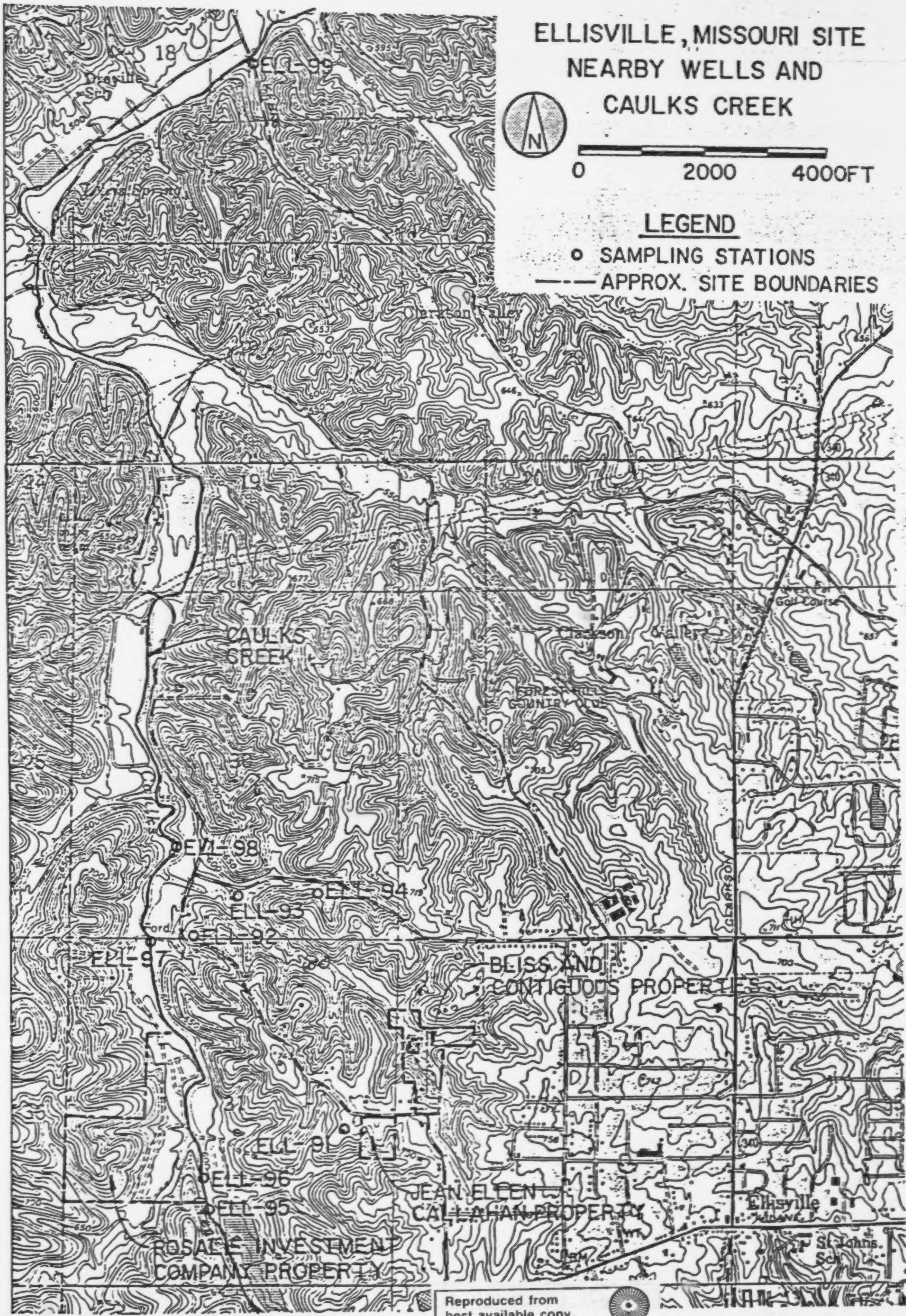
Location	
ELL-41	Buried drums Buried uncontainerized hazardous wastes Contaminated soil around the location
ELL-42	Possibility of buried drums
ELL-43	Buried drums Minor 2,3,7,8-TCDD contamination
ELL-44	Buried uncontainerized hazardous wastes Contaminated soil around the location
ELL-45	Buried drums Minor 2,3,7,8-TCDD contamination
ELL-46	Buried drums
ELL-47	Minor 2,3,7,8-TCDD contamination Possibility of buried drums
ELL-48	Buried drums Buried uncontainerized hazardous wastes
ELL-49	Major 2,3,7,8-TCDD contamination
ELL-50	Buried uncontainerized hazardous wastes
ELL-51	Buried uncontainerized hazardous wastes Possibility of buried drums
ELL-52	Possibility of buried drums
ELL-53	Possibility of buried drums
ELL-61	Major 2,3,7,8-TCDD contamination
ELL-62	Major 2,3,7,8-TCDD contamination
ELL-64	Major 2,3,7,8-TCDD contamination
Creek "A" near ELL-71	Contaminated sediments

Attachment 6



ELLISVILLE, MISSOURI SITE
NEARBY WELLS AND
CAULKS CREEK

N
0
2000
4000FT
LEGEND
o SAMPLING STATIONS
---- APPROX. SITE BOUNDARIES
ELL-99
18
19
20
24
25
29
30
Clarkson Valley
CAULKS CREEK
FOREST HILLS COUNTRY CLUB
West Far Golf Course
ELL 98
ELL-94
ELL-93
ELL-92
ELL-97
Ford
BLISS AND CONTIGUOUS PROPERTIES
ELL-91
ELL-96
ELL-95
JEAN ELLEN CALLAHAN PROPERTY
ROSALIE INVESTMENT COMPANY PROPERTY
Ellisville
St Johns Sch
CLARKSON
340

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FIGURE II

Summary of Highest Concentrations Detected

A. SOIL: ELL 41-53, ELL 61-64

PRIORITY POLLUTANT COMPOUNDS

Acid Compounds	(ppb)	Sample Number
2,4,6-trichlorophenol	460*	ELL-44-SS-03
phenol	1,200	ELL-49-SS-01
Base/Neutral Compounds		
isophorone	88,000	ELL-41-HW-01
naphthalene	400,000	ELL-41-HW-01
bis(2-ethylhexyl)phthalate	240,000	ELL-50-HW-01
di-n-butyl phthalate	10,000	ELL-44-HW-01
di-n-octyl phthalate	2,600	ELL-49-SS-01
N-nitrosodiphenylamine	680	ELL-50-SS-04
diethyl phthalate	800	ELL-61-SS-02
dimethyl phthalate	1,300	ELL-61-SS-02
butyl benzyl phthalate	440	ELL-64-SS-02
Volatiles		
chloroform	5,900	ELL-41-HW-01
ethylbenzene	120,000	ELL-41-SS-01
tetrachloroethylene	91,000	ELL-41-HW-01
toluene	2,700,000	ELL-44-HW-01
trichloroethylene	190,000	ELL-41-HW-01
1,1,1-trichloroethane	1,300	ELL-64-SS-03
1,1-dichloroethane	8.5	ELL-64-SS-03
methylene chloride	140	ELL-49-SS-03
flourotrichloromethane	5.3	ELL-45-HW-01
1,1,2,2-tetrachloroethane	6.2	ELL-49-SS-01
trans-1,2-dichloroethene	16,000	ELL-50-HW-01
1,2-dichloroethane	4.0	ELL-64-SS-03
Pesticides		
PCB - 1242	368	ELL-42-SS-03
PCB - 1254	1,800	ELL-50-SS-01
PCB - 1248	3,400	ELL-50-SS-01
PCB - 1260	1,090	ELL-62-SS-01
Dioxins		
2,3,7,8-TCDD	120	ELL-64-SS-02

NON-PRIORITY POLLUTANT COMPOUNDS

Acid Compounds	(ppb)	Sample Number
nd		
Base/Neutral Compounds		
2-methylnaphthalene	68,000	ELL-41-HW-01
Volatiles		
acetone	170,000	ELL-41-SS-03
2-butanone	5,900	ELL-41-SS-02
4-methyl-2-pentanone	330,000	ELL-41-HW-01
o-xylene	1,900,000	ELL-41-HW-01

TENTATIVELY IDENTIFIED COMPOUNDS	(ppb)	Sample Number
(1,1-dimethylethyl) benzene	630	ELL-41-SS-04
(1,methylethyl) benzene	210,000	ELL-41-HW-01
1,3-dimethylbenzene (m-xylene)	1,300,000	ELL-41-HW-01
2-ethyl-1, 4-dimethylbenzene	900,000	ELL-41-HW-01
1,3,5-trimethylbenzene	630,000	ELL-41-HW-01
1,2,3-trimethylbenzene	430,000	ELL-44-HW-01
propylbenzene	220,000	ELL-41-HW-01
2-butanol	450	ELL-41-SS-02
3-methyl-2-butanone	3.9	ELL-41-SS-02
decane	6,200	ELL-41-SS-03
dodecane	3,000	ELL-46-SS-04
2-butoxy ethanol	630,000	ELL-41-HW-01
2-ethoxy ethanol	38,000	ELL-41-SS-02
1-(2,4-dimethylphenyl) ethanone	540	ELL-41-SS-01
3-ethyl-2-methyl-heptane	280	ELL-41-SS-01
5-ethyl-2-methyl-heptane	2,600	ELL-41-SS-03
hexane	7,900	ELL-41-HW-01
3-hexen-2-one	3,200	ELL-41-SS-02
1,2,3-trimethylcyclohexane	40,000	ELL-41-HW-01
1,1,3-trimethylcyclohexane	34,000	ELL-41-HW-01
2,6-dimethyloctane	2,400	ELL-50-SS-01
nonane	240,000	ELL-41-HW-01
5-butyl-nonane	270	ELL-41-SS-04
4-penten-2-ol	8,200	ELL-41-SS-04
4-methyl-2-pentanol	3,500	ELL-44-SS-04
3-methylene-2-pentanone	3,200	ELL-44-SS-04
methylcyclopentane	2,800	ELL-41-HW-01
4-methyl-3-penten-2-one	140,000	ELL-41-HW-01
1-cyclopropyl-2-propanone	17	ELL-41-SS-02
undecane	110,000	ELL-41-HW-01
1,4-diethylbenzene	8.0	ELL-42-SS-04
1-methyl-2-(1-methylethyl) benzene	510	ELL-42-SS-02
1,3-dioxolane	11	ELL-42-SS-04
cyclohexanol	300	ELL-42-SS-02
2-ethyl-1-hexanol	660	ELL-42-SS-01
2,3,4-trimethylhexane	710	ELL-42-SS-02
2,3-dihydro-1,1,3-trimethyl-3-phenyl-1H-indene	330	ELL-42-SS-01
cyanamide	890	ELL-53-SS-02
2,2,4-trimethyl-1,3-pentanediol	610	ELL-42-HW-01
2-propanol	43	ELL-42-SS-04
3,5,24-trimethyl tetracontane	880	ELL-42-SS-02
3,3,5-trimethylheptane	610	ELL-43-SS-01
2-propyl-1-heptanol	1,200	ELL-43-SS-01
2,4-dimethylhexane	400	ELL-43-SS-02
3,3-dimethylhexane	2,700	ELL-44-SS-04

TENTATIVELY IDENTIFIED COMPOUNDS	(ppb)	Sample Number
2-methylnonane	680	ELL-43-SS-02
4,6,8-trimethyl-1-nonene	820	ELL-48-HW-01
octacosane	670	ELL-43-SS-02
2,3-dimethyloctane	460	ELL-43-SS-01
2,7-dimethyloctane	160	ELL-43-SS-02
3,7-dimethyl-1-octene	450	ELL-43-SS-01
2,3,4-trimethylpentane	200	ELL-43-SS-02
4,4'-dichloro-1, 1'biphenyl	230	ELL-51-SS-01
tetrachloro-1, 1'biphenyl	280	ELL-43-SS-03
2,4,6-trichloro-1, 1'biphenyl	1,000	ELL-43-SS-03
1,3-diethylbenzene	310,000	ELL-44-HW-01
1-ethyl-2-methylbenzene	310	ELL-44-SS-03
1-ethyl-3-methylbenzene	14,000	ELL-44-SS-01
1-methyl-4-propylbenzene	59,000	ELL-44-HW-01
1-methyl-3-propylbenzene	340,000	ELL-44-HW-01
1,2,4-trimethylbenzene	430,000	ELL-44-HW-01
1,2,3,5-tetramethylbenzene	240,000	ELL-44-HW-01
1,1'-biphenyl	1,200	ELL-44-SS-01
2-(2-methoxyethoxy) ethanol	1,700	ELL-46-SS-04
N-cyclohexyl-cyclohexanamine	34,000	ELL-44-SS-02
1-(2-methoxy-1-methylethoxy)-2-propanol	51,000	ELL-44-SS-02
1-(2-methoxypropoxy)-2-propanol	5,100	ELL-44-SS-04
butyl-2-methylpropylester-1,2-benzenedicarboxylic acid	400	ELL-45-SS-04
2,4-dimethyl-1-(1-methylethyl) benzene	2,400	ELL-46-SS-03
1-ethyl-2,4,5-trimethylbenzene	1,600	ELL-46-SS-02
1-methyl-2-(2-propenyl)-benzene	470	ELL-45-HW-01
tricyclo [3.3.1.13,7] decane	6.8	ELL-45-SS-01
1,3,5-cycloheptatriene	650	ELL-45-SS-02
octahydro-cis-1H-indene	12	ELL-45-HW-01
(1,1-dimethylpropyl)benzene	5,200	ELL-50-HW-01
octadecane	1,300	ELL-46-SS-02
pentadecane	900	ELL-49-SS-01
tridecane	1,200	ELL-61-SS-01
tetradecane	3,200	ELL-61-SS-01
2,3-dihydro-1, 6-dimethyl-1H-indene	860	ELL-46-SS-02
2,3-dihydro-1,3-dimethyl-1H-indene	1,400	ELL-46-SS-02
2,3-dihydro-4-methyl-1H-indene	3,700	ELL-46-SS-04
triphenylester phosphoric acid	580	ELL-46-SS-04
4-hydroxy-3-methoxy benzaldehyde	380	ELL-51-HW-01
1-(4-hydroxy-3,5-dimethoxyphenyl)-ethanone	500	ELL-48-SS-01

TENTATIVELY IDENTIFIED COMPOUNDS	(ppb)	Sample Number
2,4-dimethylheptane	490	ELL-63-SS-02
3,4-dimethylheptane	2,200	ELL-48-HW-01
3,3,5-dimethylheptane	660	ELL-48-HW-01
hexadecanoic acid	980	ELL-48-SS-01
2,2,3,4-tetramethylpentane	990	ELL-48-HW-01
1-ethyl-3,5-dimethylbenzene	1,000	ELL-49-SS-01
eicosane	1,200	ELL-49-SS-03
heptadecane	1,400	ELL-49-SS-01
hexadecane	2,600	ELL-61-SS-01
2,6,10,14-tetramethylpentadecane	1,400	ELL-50-SS-04
2,6-dimethylundecane	1,200	ELL-49-SS-01
o-decylhydroxylamine	2,000	ELL-50-SS-01
2,6,11-trimethyl dodecane	1,200	ELL-50-SS-01
2,6,10,14-tetramethylheptadecane	2,900	ELL-61-SS-01
2,2,3,3,5,6,6-heptamethyl heptane	940	ELL-50-SS-01
4-ethyl heptane	340	ELL-50-SS-01
2-ethyl-4-methyl-1-pentanol	980	ELL-50-SS-01
2-methylundecane	2,100	ELL-50-SS-01
5-methyl-1-hexene	180	ELL-51-HW-01
1,3-isobenzofurandione	860	ELL-51-HW-01
octanoicacid	550	ELL-51-HW-01
1,5-dihydro-1-methyl-2H -pyrrol-2-one	340	ELL-51-SS-03
2,5,8,11,14-pentaoxapentadecane	300	ELL-53-SS-02
cyclohexane	53,000	ELL-61-SS-04
(2-methoxyethoxy) ethene	78,000	ELL-61-SS-04
2-butyl-1-octanol	920	ELL-61-SS-01
1,1'-oxybisethane	3	ELL-63-SS-03
3,5-dimethylheptane	510	ELL-63-SS-02

B. MID-AMERICA ARENA: ELL 81-85 (Soil & Dust)

PRIORITY POLLUTANT COMPOUNDS

Acid Compounds	(ppb)	Sample Number
nd		
Base/Neutral Compounds		
nd		
Volatiles		
methylene chloride	140	ELL-81-SS-02
tetrachloroethylene	55	ELL-82-SS-03
trichloroethylene	15	ELL-82-SS-01
Pesticides		
PCB - 1260	1,900	ELL-81-SS-01
Dioxins		
2,3,7,8-TCDD (Dust Sample)	4.8	ELL-84-DU-01

NON-PRIORITY POLLUTANT COMPOUNDS

Acid Compounds

nd

Base/Neutral Compounds

nd

Volatiles

nd

TENTATIVELY IDENTIFIED COMPOUNDS

5-(pentyloxy)-(E)-2-pentene	5,000	ELL-81-SS-02

C. GROUND WATER: ELL 45, 51, 52

PRIORITY POLLUTANT COMPOUNDS

Acid Compounds	(ug/l)	Sample Number
nd		
Base/Neutral Compounds		
bis(2-ethylhexyl) phthalate	600	ELL-52-GW-01
Volatiles		
1,1,1-trichloroethane	180	ELL-52-GW-01
1,1-dichloroethane	35	ELL-52-GW-01
methylene chloride	28	ELL-51-GW-01
Pesticides		
nd		
Dioxins		
nd		

NON-PRIORITY POLLUTANT COMPOUNDS

Acid Compounds	(ug/l)	Sample Number
nd		
Base/Neutral Compounds		
nd		
Volatiles		
nd		

TENTATIVELY IDENTIFIED COMPOUNDS

1,1'-oxybisethane	5.3	ELL-51-GW-01

D. SURFACE WATER: ELL 71 - 73

PRIORITY POLLUTANT COMPOUNDS

Acid Compounds	(ug/l)	Sample Number
nd		
Base/Neutral Compounds		
nd		
Volatiles		
1,1,1-trichloroethane	6.5	EL-73-SW-01
Pesticides		
nd		
Dioxins		
nd		

NON-PRIORITY POLLUTANT COMPOUNDS

Acid Compounds		
nd		
Base/Neutral Compounds		
nd		
Volatiles		
nd		

TENTATIVELY IDENTIFIED COMPOUNDS

cyclohexane	3,000	ELL-71-SW-01
1,1,2-trichloro-1,2,2-triflouroethane	12	ELL-71-SW-01

E. SEDIMENT: ELL 71 - 73

PRIORITY POLLUTANT COMPOUNDS

Acid Compounds	(ppb)	Sample Number
nd		
Base/Neutral Compounds		
bis(2-ethylhexyl) phthalate	19,000	ELL-71-SL-01
Volatiles		
trans-1,2-dichloroethylene	3.4	ELL-71-SL-01
methylene chloride	31	ELL-71-SL-01
toluene	22	ELL-71-SL-01
Pesticides		
nd		
Dioxins		
nd		

NON-PRIORITY POLLUTANT COMPOUNDS

Acid Compounds		
4-methylphenol	1,300	ELL-71-SL-01

Base/Neutral Compounds	(ppb)	Sample Number
nd		
Volatiles		
o-xylene	5.8	ELL-71-SL-01
TENTATIVELY IDENTIFIED COMPOUNDS		
4-hydroxy-3-methoxybenzaldehyde	500	ELL-71-SL-01
1,3-dimethylbenzene (m-xylene)	1,700	ELL-71-SL-01
5-ethyl-2-methyl heptane	2,800	ELL-71-SL-01
3-ethylheptane	1,800	ELL-71-SL-01
1,3,5-cycloheptatriene	1,800	ELL-71-SL-01
cyclohexanol	360	ELL-73-SL-01
hexane	2.3	ELL-71-SL-01
hexadecanoic acid	5,600	ELL-71-SL-01
methylcyclohexane	7.3	ELL-71-SL-01
decane	2,800	ELL-71-SL-01
undecane	2,200	ELL-71-SL-01
1,1'-oxybisethane	26	ELL-72-SL-01
o-decyl-hydroxylamine	3,600	ELL-71-SL-01
3-methylnonane	1,300	ELL-71-SL-01
2,2,3,4-tetramethylpentane	6,000	ELL-71-SL-01

F. DRINKING WATER WELLS: ELL 91 - 94

PRIORITY POLLUTANT COMPOUNDS

Acid Compounds	(ug/l)	Sample Number
nd		
Base/Neutral Compounds		
nd		
Volatiles		
nd		
Pesticides		
nd		
Dioxins		
nd		
NON-PRIORITY POLLUTANT COMPOUNDS		
Acid Compounds		
nd		
Base/Neutral Compounds		
nd		
Volatiles		
nd		
TENTATIVELY IDENTIFIED COMPOUNDS		
nd		
METALS		
Boron	129	ELL-91-GW-01
Iron	245	ELL-91-GW-01
Zinc	565	ELL-91-GW-01

G. CAULKS CREEK WATER: ELL 95 - 99

PRIORITY POLLUTANT COMPOUNDS

Acid Compounds	(ug/1)	Sample Number
nd		
Base/Neutral Compounds		
di-n-butyl phthalate	10	ELL-95-SW-01
Volatiles		
methylene chloride	30	ELL-95,96-SW-01
tetrachloroethylene	7	ELL-95,96-SW-01
Pesticides		
aldrin	.27	ELL-96-SW-01
heptachlor	.38	ELL-96-SW-01
gamma-BHC (1 indane)	.14	ELL-96-SW-01
Dioxins		
nd		

NON-PRIORITY POLLUTANT COMPOUNDS

Acid Compounds

nd

Base/Neutral Compounds

nd

Volatiles

nd

TENTATIVELY IDENTIFIED COMPOUNDS

9-hexadecenoic acid	11	ELL-98-SW-01
hexadecenoic acid	15	ELL-95,96,SW-01

Summary of Health Effects and Properties of Compounds Identified as Principal Contaminants

2,3,7,8-TCDD - Highly lethal at low doses to aquatic organisms, birds, and mammals, including man. It has been shown to be acnegenic, embryolethal, teratogenic, mutagenic (in certain organisms), carcinogenic, and to affect the immune responses in mammals. It is highly persistent in the environment and can be bioaccumulated. Exposure routes include skin absorption, inhalation, and ingestion.

Toluene - May cause irritation of the eyes, respiratory tract, and skin. It is a suspected carcinogen and mutagen. Acute exposure results in central nervous system depression and liver disease. It has been shown to be embryotoxic in experimental animals. Sorption processes may be significant. It is slightly persistent in the environment. It is a potential fire hazard. Exposure routes include inhalation and ingestion.

Xylenes - Has been shown to be fetotoxic in rats and mice. In humans, exposure to high concentrations adversely affects the central nervous system and irritates the mucous membranes. In vapor form, it is a dangerous fire hazard. Because of low water solubility and rapid biodegradation, it appears that xylenes are unlikely to leach into ground water in high concentrations. Exposure routes include inhalation and ingestion.

Trichloroethylene (TCE) - It is carcinogenic to mice after oral administration, producing hepatocellular carcinomas. It was found to be mutagenic using several microbial assay systems. Chronic inhalation exposure to high concentrations caused liver, kidney, and neural damage and dermatological reactions in animals. It rapidly volatilizes, adsorbs to organic materials, and also can be bioaccumulated to some degree. It leaches into the ground water fairly readily. Acute exposure depresses the central nervous system. Exposure routes include inhalation and ingestion.

Attachment 9

TABLE 5

REMEDIAL TECHNOLOGIES FOR THE BLISS AND CONTIGUOUS PROPERTIES

Remedial Technologies	Remarks
A. Surface Water Controls	
1. Surface seals	Appropriate for insitu containment or onsite disposal
2. Surface water diversion and collection systems	Appropriate for insitu containment or onsite disposal
3. Grading	Appropriate for all onsite actions
4. Revegetation	Appropriate for all onsite actions
B. Subsurface Controls	
1. Impermeable barriers, such as slurry walls	Appropriate for insitu containment
2. Permeable treatment beds	Not appropriate: fissured and solution channeled bedrock aquifer with water table far below wastes
3. Ground water pumping	Not appropriate: fissured and solution channeled bedrock aquifer with water table below wastes
4. Leachate control, such as liners	Appropriate for onsite disposal
C. Waste Treatment	
1. Biological methods	Appropriate for treatable wastes in drums and waste mixtures
2. Chemical methods	Appropriate for treatment of wastes in drums
3. Physical methods	Appropriate for treatment of wastes in drums
D. Insitu Treatment of Waste Mixtures and Contaminated Soil	
1. Solution mining	Not appropriate: clay soil, hydrogeological setting
2. Detoxification	Not appropriate: clay soil
3. Microbiological degradation	Not appropriate: soil mass too deep for insitu landfarming, hydrogeological setting

TABLE 5
(Continued)

Remedial Technologies	Remarks
E. Onsite Treatment of Waste Mixtures and Contaminated Soil	
1. Incineration/wet air oxidation	Not appropriate: mobile equipment not available
2. Solidification/encapsulation	Appropriate for dioxin contaminated soil
3. Soil washing	Not appropriate: clay soil
4. Detoxification	Not appropriate: clay soil
5. Microbiological degradation	Appropriate
F. Contaminated Soil Removal	
1. Excavation	Appropriate for treatment, onsite disposal or offsite disposal
2. Hydraulic dredging	Not appropriate: above water table
3. Mechanical dredging	Not appropriate: above water table
G. Offsite Transport for Secure Disposal	Appropriate for offsite disposal

Attachment 10

DEVELOPMENT OF ALTERNATIVES

40 CFR 300.68(f) Category	Alternative Developed
° Alternatives for treatment or disposal at an offsite facility	BD-5
° Alternatives that attain applicable or relevant and appropriate Federal public health and environmental requirements.	BD-4
° Alternatives that exceed applicable or relevant and appropriate Federal public health and environmental requirements	BWM-5: where contaminated soils, although suitable for land disposal, would be incinerated.
° Alternatives that do not attain applicable or relevant and appropriate Federal public health and environmental requirements...	BD-2
° No action alternative	BDCS-1

TABLE 6

COMPARISON OF BLISS AND CONTIGUOUS PROPERTIES ALTERNATIVES FOR BURIED CONTAINERIZED WASTES

Alternative	Preliminary Opinion of Probable Cost	Significant Adverse Environmental Effects	Adequate Control or Effectiveness	Reliability	Implementability	Operation and Maintenance Requirements	Safety and Regulatory Requirements	Public Acceptance
BD-1 No Action	0	Yes - Probable contamination of ground water used for water supply; potential for direct contact; potential for degradation of air quality in nearby residential areas	Provides no control to prevent direct contact or spread of hazardous wastes	None	Not required	None	Disregards	Probably very negative to continued presence of uncontrolled hazardous wastes in a residential area
BD-2 Insitu Containment with Slurry Wall and Impervious Cap	$2,100,000	Yes - Probable future contamination of ground water used for water supply if liquid wastes are not contained	Effective control of non-liquid wastes, but liquid wastes may enter ground water because bottom of containment area not controlled	Reliable for non-liquid waste; not reliable for liquid wastes; perpetual care of closed site may not be provided	Could be implemented; however multiple ownership of land is potential obstacle	Maintain monitoring wells; sample and analyze ground water; control erosion and maintain soil and membrane cap; restrict future use of site	Would require security fence and restricted access to containment site	Probably negative to continued presence of incompletely controlled hazardous waste in the environment, particularly with respect to ground water
BD-3 Treatment	$980,000 to $1,200,000	None apparent	Yes, if proven effective by treatability study	Reliable if effective treatment is provided	Could be implemented if effective treatment is available	None	Residue from detoxified wastes would have to be placed in a permitted disposal site	Probably positive to removal of hazardous waste from a residential area

TABLE 6
(Continued)

COMPARISON OF BLISS AND CONTIGUOUS PROPERTIES ALTERNATIVES FOR BURIED CONTAINERIZED WASTES

Alternative	Preliminary Opinion of Probable Cost	Significant Adverse Environmental Effects	Adequate Control or Effectiveness	Reliability	Implementability	Operation and Maintenance Requirements	Safety and Regulatory Requirements	Public Acceptance
BD-4 Onsite Disposal in a Secure Landfill	$930,000 (overpack) $710,000 (bulking)	None apparent	Yes	Reliable as long as integrity of landfill liner and cap is maintained	Could be implemented; however multiple ownership of land is potential obstacle	Maintain monitoring wells; sample and analyze ground water; provide erosion control; maintain security and integrity of site and landfill, restrict future use of site	Would require security fence and restricted access to landfill area	Probably negative to continued presence of hazardous waste in a residential area, even if wastes are contained in a secure landfill
BD-5 Offsite Disposal at Permitted Disposal Facilities	$710,000 (overpack) $540,000 (bulking)	None apparent	Yes	Good	Good	Responsibility of the offsite permitted disposal facility	Responsibility of the offsite permitted disposal facility	Probably positive to to removal of hazardous waste from a residential area

TABLE 7

COMPARISON OF BLISS AND CONTINGUOUS PROPERTIES ALTERNATIVES FOR WASTE MIXTURES

Alternative	Preliminary Opinion of Probable Cost	Significant Adverse Environmental Effects	Adequate Control or Effectiveness	Reliability	Implementability	Operation and Maintenance Requirements	Safety and Regulatory Requirements	Public Acceptance
BWM-1 No Action	0	Yes - Probable contamination of ground water used for water supply; potential for direct contact; potential for degradation of air quality in residential areas	Provides no control to prevent direct contact or spreading of hazardous wastes	None	Not required	None	Disregards	Probably very negative to continued presence of uncontrolled hazardous wastes in a residential area
BWM-2 Insitu Containment with Slurry Wall and Impervious Cap	$2,100,000	None apparent	Will effectively prevent direct contact with and migration of hazardous wastes if all liquid wastes are removed	Reliable as long as integrity of containment system is maintained	Could be implemented; however multiple land ownership is a potential obstacle	Maintain monitoring wells; sample and analyze ground water; control erosion and maintain soil and membrane cap; restrict future use of site	Would require security fence and restricted access to containment area	Probably negative to permanent storage of hazardous waste in a residential area
BWM-3 Onsite Biological Treatment	$1,100,000	Greatest potential for direct contact and for release of contaminated leachate and runoff	Yes, if proven effective by treatability study	Reliability is dependent on treatability of waste	Could be implemented if treatability is proven, however land is severely restricted and not well suited for treatment	Monitor gas and liquid effluents from treatment area; impound contaminated runoff and recycle to treatment area	Wastes would be detoxified and treated soil would be replaced in its original location	Probably negative due to potential for release of contaminated effluents during treatment

TABLE 7
(Continued)

COMPARISON OF BLISS AND CONTINGUOUS PROPERTIES ALTERNATIVES FOR WASTE MIXTURES

Alternative	Preliminary Opinion of Probable Cost	Significant Adverse Environmental Effects	Adequate Control or Effectiveness	Reliability	Implementability	Operation and Maintenance Requirements	Safety and Regulatory Requirements	Public Acceptance
BWM-4 Onsite Disposal in Secure Landfill	$1,300,000	None apparent	Yes	Reliable as long as integrity of landfill liner and cap is maintained	Could be implemented; however land space for landfill is quite limited	Remove and dispose of any leachate; maintain monitoring wells; sample and analyze ground water; control erosion and maintain soil and membrane cap; restrict future use of site	Would require security fence and restricted access to landfill area	Probably negative to permanent storage of hazardous waste in a residential area
BWM-5 Offsite Disposal at Permitted Disposal Facilities	$1,100,000	None apparent	Yes	Good	Good	Responsibility of the offsite permitted disposal facility	Responsibility of the offsite permitted disposal facility	Probably positive to to removal of hazardous waste from a residential area

TABLE 8

COMPARISON OF BLISS AND CONTIGUOUS PROPERTIES ALTERNATIVES FOR DIOXIN CONTAMINATED SOIL

Alternative	Preliminary Opinion of Probable Cost	Significant Adverse Environmental Effects	Adequate Control or Effectiveness	Reliability	Implementability	Operation and Maintenance Requirements	Safety and Regulatory Requirements	Public Acceptance
BDCS-1 No Action	0	Allows for direct contact with dioxin contaminated soil and gravel in a residential area; contaminated soil may be transported and deposited along creek and may enter ground water used for water supply	Provides no control to prevent direct contact with, or spreading of, dioxin contaminated soil	None	Not required	None	Disregards	Probably very negative to continued presence of uncontrolled hazardous waste in a residential area
BDCS-2 Insitu Containment with Slurry Wall and Impervious Cap	$2,100,000	None apparent	Will effectively prevent direct contact with, and migration of, dioxin contaminated soil	Reliable as long as integrity of containment system is maintained	Could he implemented; however multiple land ownership may be an obstacle	Maintain monitoring wells; sample and analyze ground water; control erosion and maintain soil and membrane cap; restrict future use of site	Would require security fence and restricted access to containment area	Probably negative to permanent storage of hazardous waste in a residential area

TABLE 8
(Continued)

COMPARISON OF BLISS AND CONTIGUOUS PROPERTIES ALTERNATIVES FOR DIOXIN CONTAMINATED SOIL

Alternative	Preliminary Opinion of Probable Cost	Significant Adverse Environmental Effects	Adequate Control or Effectiveness	Reliability	Implementability	Operation and Maintenance Requirements	Safety and Regulatory Requirements	Public Acceptance
BDCS-3 Onsite Treatment by solidification with soil-cement	$1,000,000	None apparent	Will effectively prevent direct contact with, or spreading of, dioxin contaminated soil	Good	Could be implemented; however multiple land ownership may be an obstacle	Maintain monitoring wells; sample and analyze ground water; maintain soil cement pavement and drainage facilities	Security fence and restricted access not required	Probably negative to permanent storage of hazardous wastes in a residential area
BDCS-4 Onsite Disposal in a Secure Landfill	$1,900,000 (below grade) $2,800,000 (above grade)	None apparent	Yes	Reliable as long as integrity of landfill liner and cap is maintained	Could be implemented; however suitable land is limited; multiple ownership of land may be an obstacle	Maintain monitoring wells; sample and analyze ground water; provide erosion control; maintain soil and membrane cap; maintain security and integrity of landfill; restrict future use of site	Would require security fence and restricted access to landfill site	Probably negative to continued presence of hazardous waste in a residential area

TABLE 8
(Continued)

COMPARISON OF BLISS AND CONTIGUOUS PROPERTIES ALTERNATIVES FOR DIOXIN CONTAMINATED SOIL

Alternative	Preliminary Opinion of Probable Cost	Significant Adverse Environmental Effects	Adequate Control or Effectiveness	Reliability	Implementability	Operation and Maintenance Requirements	Safety and Regulatory Requirements	Public Acceptance
BDCS-5 Offsite Disposal	$1,700,000	Large volume of heavy truck traffic in residential area	Yes	Reliable if a permitted disposal facility is available	Could be implemented only if permitted offsite facility is available	Responsibility of the offsite permitted disposal facility	Responsibility of the offsite permitted disposal facility	Probably positive to removal of hazardous waste from a residential area
BDCS-5 Offsite Storage Subalternative	$1,000,000 plus future costs	Large volume of heavy truck traffic in residential area	Incomplete, detoxification must be addressed in the future	Reliable if offsite repository is available	Could be implemented only if offsite repository is available	Responsibility of the offsite repository	Responsibility of the offsite repository	Probably positive to removal of hazardous waste from a residential area

Attachment 12

Program	Remedial Action Alternative		Preliminary Opinion of Approximate Probable Cost ($)
A	BD-5	Offsite disposal	540,000
	BWM-5	Offsite disposal	1,100,000
	BDCS-5	Offsite disposal	1,700,000
			3,300,000
B	BD-5	Offsite disposal	540,000
	BWM-5	Offsite disposal	1,100,000
	BDCS-5	Offsite storage	1,000,000 (1)
			2,600,000
C	BD-5	Offsite disposal	540,000
	BWM-5	Offsite disposal	1,100,000
	BDCS-3	Treatment	1,000,000
			2,600,000
D	BD-5	Offsite disposal	540,000
	BWM-3	Treatment	1,100,000
	BDCS-3	Treatment	1,000,000
			2,600,000
E	BD-5	Offsite disposal	540,000
	BWM-2	Insitu containment	2,100,000 (2)
			2,600,000

(1) Not including future handling and treatment costs.

(2) Containment system for BWM-2 will also contain dioxin-contaminated soil at no additional cost.

Attachment 13

Table 4-1
COMPARISON OF INTERIM STORAGE ALTERNATIVES

Alternative	Advantages	Disadvantages
Concrete Tank		**Technical**
	o High structural integrity and reliability o Requires less area than container facility o High walls make distribution/placement of wastes easy relative to other bulk storage alternatives	o No use for tank when empty; no salvage value o Demolition/removal is expensive o Possible large quantities of leachate generated during waste placement/removal necessitate large treatment facility (relative to enclosed wastepile) o Difficult operation of equipment in tank when the fine-grained soils become wet due to precipitation o If excavation temporarily halted, difficult to install and remove temporary cover o Difficult to adjust size of tank in field to suit actual volumes of wastes excavated o Requires construction of ramps which will occupy considerable area and may hamper staging of construction operations
		Environmental and Public Health
	None	o Slightly higher risk of exposure to contaminants is associated with bulk waste handling than with containerized handling o Some potential for dispersion of wastes by wind during placement due to lack of cover

Table 4-1
(continued)

Alternative	Advantages	Disadvantages
Enclosed Wastepile	**Technical**	
	o Low quantities of leachate generated relative to concrete tanks and monofill alternatives o No temporary cover required if excavation interrupted o Steel-framed building may be easily dismantled and removed	o Volume of waste stored per unit area is low, especially in narrow structure o Unlikely that building can be decontaminated to a level to render it suitable for other uses after interim bulk storage of TCDD wastes; low salvage value o Expansion to accommodate increased volume of wastes in field relatively difficult
	Environmental and Public Health	
	o Once wastes are in enclosure, no potential for wind or water dispersion o Excellent security	o Slightly higher risk of exposure associated with bulk waste handling relative to containerized handling

Table 4-1
(continued)

Alternative	Advantages	Disadvantages
Monofill		Technical
	o No major structure to remove at end of interim storage period	o Volume of waste stored per unit area is low for narrow configuration o If excavation temporarily halted, difficult to install and remove a temporary cover o Possible large quantities of leachate/runoff generated during placement and removal period necessitate a large treatment facility (relative to enclosed wastepile) o Difficult operation of equipment on fill when fined-grained soils become wet due to precipitation o Potential for slope instability of fine-grained soils placed in very wet conditions
	Environmental and Public Health	
	None	o Slightly higher risk of exposure associated with bulk waste handling relative to containerized handling o Potential for dispersion of wastes by wind during placement due to height (25 feet) and lack of cover

Table 4-1
(continued)

Alternative	Advantages	Disadvantages
Container Facility with Building Enclosure		**Technical**
	o Containerized storage minimizes contamination of building enclosure; it may be more easily cleaned to render it suitable for use as arena or for other purposes after removal	o Container handling slows excavation
	o No contaminated leachate collection gravel to dispose of at end of interim storage period	o Container storage makes less efficient use of space than bulk storage
	Environmental and Public Health	
	o Containerization at point of excavation reduces exposure potential	None
	o Excellent security	
Container Facility with Synthetic Membrane Enclosure		**Technical**
	o Size of facility relatively easy to adjust to accommodate varying volumes of waste	o Container handling slows excavation
	o No contaminated leachate collection gravel to dispose of at end of interim storage period	o Container storage makes less efficient use of space than bulk storage
	Environmental and Public Health	
	o Containerization at point of excavation reduces exposure potential	None

Attachment 14

TABLE 4-2
COST SUMMARY

ITEM	CONCRETE TANK	COMPOSITE COVER MONOFILL	DOUBLE SYNTHETIC COVER MONOFILL	ENCLOSED WASTEPILE	CONTAINERS/ ENCLOSED BUILDING	CONTAINERS/ MEMBRANE ENCLOSURE
CONTAINMENT CONSTRUCTION						
GENERAL	137,000	128,000	129,000	166,000	187,000	163,000
SITE PREPARATION	464,000	464,000	464,000	464,000	464,000	464,000
CONTAINMENT BASE	415,000	343,000	376,000	435,000	431,000	431,000
CONTAINMENT SIDEWALLS	243,000	65,000	65,000	73,000	72,000	72,000
RAMPS (2)	31,000					
COVER CONSTRUCTION	144,000	193,000	198,000	1,017,000		
CONTAINMENT ENCLOSURE					1,530,000	956,000
WASTE EXCAVATION AND PLACEMENT						
GENERAL	250,000	250,000	250,000	232,000	347,000	347,000
SITE PREPARATION	100,000	100,000	100,000	100,000	100,000	100,000
WASTE EXCAVATION	552,000	552,000	552,000	552,000	3,123,000	3,123,000
PLACEMENT OF WASTE	249,000	249,000	249,000	138,000		
TREATMENT AND MONITORING						
GENERAL	67,000	63,000	63,000	40,000	42,000	51,000
AIR MONITORING	260,000	212,000	212,000	212,000	260,000	260,000
GROUNDWATER MONITORING	30,000	30,000	30,000	30,000	30,000	30,000
SOIL SAMPLING	465,000	425,000	425,000	425,000	465,000	465,000
WATER TREATMENT FACILITY	842,000	842,000	842,000	288,000	249,000	461,000
SITE RESTORATION	147,000	147,000	147,000	147,000	147,000	147,000
CONSTRUCTION SUBTOTAL	4,396,000	4,063,000	4,102,000	4,319,000	7,447,000	7,070,000
BID CONTINGENCY (15%)	659,000	609,000	615,000	648,000	1,117,000	1,061,000
SCOPE CONTINGENCY (20%)	879,000	813,000	820,000	864,000	1,489,000	1,414,000
CONSTRUCTION TOTAL	5,934,000	5,485,000	5,537,000	5,831,000	10,053,000	9,545,000
PERMITTING (5%)	297,000	274,000	277,000	292,000	503,000	477,000
SDC (10%)	593,000	549,000	554,000	583,000	1,005,000	955,000
TOTAL IMPLEMENTATION COSTS	6,824,000	6,308,000	6,368,000	6,706,000	11,561,000	10,977,000
ENGINEERING DESIGN	546,000	505,000	509,000	536,000	925,000	878,000
TOTAL CAPITAL COST	7,370,000	6,813,000	6,877,000	7,242,000	12,486,000	11,855,000
OPERATION AND MAINTENANCE (10-yr present worth)	1,082,000	1,082,000	1,082,000	1,008,000	897,000	1,008,000
FACILITY DEMOLITION (present worth)	3,184,000	3,152,000	1,371,000	1,349,000	524,000	441,000
TOTAL PRESENT WORTH	11,636,000	11,047,000	9,330,000	9,599,000	13,907,000	13,304,000

RESPONSIVENESS SUMMARY

The Bliss property is one of three waste disposal areas which comprise the Ellisville site. Early community relations activities focused primarily on the initial remedial measures at the other two properties, Rosalie and Callahan, although updates on the Bliss property status were also provided. Early public relation activities consisted primarily of news releases issued in a period between 1981 and 1984, while initial remedial measures and a remedial investigation of these disposal areas were ongoing.

In July, 1984, a briefing for local public officials was held to discuss cleanup proposals of the feasibility study for the Callahan and Rosalie sites. A public meeting on these cleanup recommendations was held on August 9, 1984. Although these meetings were not intended to discuss the Bliss property, they did provide the public an opportunity to obtain information on all hazardous waste problems in the area.

On November 22, 1985, representatives of the Environmental Protection Agency, Missouri Department of Natural Resources, and Congressman Young's office met with the Mayor of Ellisville and conducted a tour of the Ellisville site.

In February, 1986, the Focused Feasibility Report for the Bliss and Contiguous Properties Site was completed. Local public officials were briefed by representatives of the Environmental Protection Agency and the Missouri Department of Natural Resources on cleanup alternatives considered by the study at a meeting on March 14, 1986. Copies of the remedial investigation and feasibility study reports, prepared for the Ellisville site, were provided to the Daniel Boone Branch Library, located in Ellisville. The availability of these documents for public review was announced by a press release issued on March 17, 1986.

A homeowners association of residents living near the site was given a special presentation on details of the focused feasibility study by a representative of the Missouri Department of Natural Resources. This meeting was held in a private residence in Wood Meadow subdivision on March 26, 1986. A public hearing on the focused feasibility study was conducted on March 31, 1986, at a local high school to obtain public input. Interested parties were encouraged to submit written comments on the report contents to the Missouri Department of Natural Resources by April 14, 1986.

On April 22, 1986, a summary of the public hearing discussions and written comments received during the comment period was prepared. This summary of results of the public participation process was mailed to local public officials and concerned citizens in the Ellisville area. A copy of this public participation summary is included in the appendix of this report.

As a result of the public hearing, construction of a fence between a bike path in Quail Woods Park and the Bliss site was initiated and completed on April 13, 1986. The need to restrict access to the site from the bike path was a major concern of many local citizens in attendance at the hearing.

Comments received during the public participation process demonstrated a general consensus on proposed methods of handling non-dioxin wastes; however, three of the options for handling the dioxin contaminated materials received public support. The comments received during the public participation process were considered in developing the final recommendations for remedial actions.

The proposed removal and off-site disposal of non-dioxin wastes and contaminated materials to satisfy established health standards was supported by local residents and officials. This alternative, due to the cost-effectiveness and environmental improvement it is anticipated to provide, was agreed to be the recommended remedial action procedure.

During the public participation process use of the earthen covered monofill, container storage in synthetic membrane enclosures, and container storage in building enclosure alternatives were supported by commentors. The monofill alternative was supported due to its relatively lower capital cost and its aesthetic appearance. Containerized storage of dioxin contaminated wastes was recommended by several commentors primarily to reduce blowing of contaminated dust during storage and at the time a final disposal method is selected. The synthetic membrane enclosure would have the lowest total implementation cost of the containerized waste storage options; however, maintenance costs of the building enclosure option are significantly lower, providing both alternatives with similar total present worth costs over a ten year period.

Containerized storage of dioxin contaminated materials in an earthen enclosure, an option not considered by the focused feasibility study, was also suggested by a commentor for consideration. This option would provide the public health advantages of containerized storage while also offering a more aesthetically acceptable appearance than the building or synthetic membrane enclosure options.

As a result of review of the engineering feasibility study and consideration of comments received during the public participation process, the container storage in a building enclosure alternative has been recommended for handling dioxin contaminated materials. This alternative has been selected primarily for its potential to provide the greatest protection of the public health and its lowest operation and maintenance requirements during the storage period. Painting of the building(s) in an earth-tone color or use of of earth-tone siding is also recommended to minimize any adverse effect on the aesthetical appearance of the neighboring area.

The monofill alternative was considered the best selection in regards to constructing a containment enclosure which would blend into the local environment. However, this alternative does present potential public health concerns related to blowing dust and erosion during construction, and also poses more significant operation and maintenance requirements during the storage period. Due to the apparent preference of local citizens to containerized storage, this alternative was not recommended for this project.

Use of containerized storage in an earthen enclosure was evaluated as a potential alternative; however, this option was considered to pose special construction problems which would hinder its implementation and result in considerably higher capital and maintenance costs. Stacking of soil filled containers, due to their uneven sizes and shapes, will result in unlevel top and side surfaces, gaps between containers, and potentially steep side slopes. A synthetic membrane liner covering for the container stack would be required to prevent settling of the enclosure soil into gaps between individual containers. Construction of an effective earthen enclosure will require significant compaction of the earthen shell to provide stable side slopes and encourage runoff of precipitation. Special compaction techniques would be required to prevent damage to the synthetic liner due to the uneven container surfaces. Also, additional fill materials to decrease side slopes would be required to prevent soil slides along the membrane surface. Although this alternative would incorporate desirable features of the monofill and containerized storage options, its implementation would present construction problems which would be difficult to overcome.

The containerized storage in a synthetic membrane enclosure alternative was not selected due to its greater potential for maintenance problems with relatively small savings in cost over the life of the storage facility.

In summary, the containerized storage in a building enclosure alternative was recommended due to its potential for providing the safest and most dependable procedure for storage of dioxin contaminated materials. The building enclosure will provide relatively easy access for container inspection and will require the least maintenance to ensure the system integrity. Containerized storage will reduce the potential for blowing dust and provide the greatest protection for workers and nearby residents as such time final disposal can be completed. This alternative is also adaptable should the actual quantities of dioxin contaminated materials be less than or greater than anticipated amounts. Use of earth-tone colored buildings is recommended to minimize concerns of the adverse impact these structures pose to aesthetics of the area.

SUMMARY: BLISS HAZARDOUS WASTE SITE PUBLIC MEETING

Prepared by the Missouri Department of Natural Resources

PURPOSE OF SUMMARY

This summary has been prepared so participants in the March 31, 1986, public meeting about the Bliss hazardous waste site can have a basic record of the meeting for future reference.

This summary also is being provided so participants can be sure that their comments were understood correctly. The information that follows is based on the transcript of the proceedings prepared by a registered professional recorder. However, if any inaccuracies are noted, please write the Missouri Department of Natural Resources, Office of Public Affairs, P.O. Box 176, Jefferson City, MO 65102. Or call 314-751-3443.

A copy of the meeting summary will be filed with other information pertaining to the site at the Daniel Boone Branch of the St. Louis County Library, 300 Clarkson Road, Ellisville.

ATTENDANCE

Fifty-two persons attended the public meeting on the Bliss hazardous waste site held at 7 p.m., March 31, 1986, at Parkway West High School, 75 W. Clayton Road.

Representatives were present from the Missouri Department of Natural Resources, the city of Ellisville, the Missouri Department of Health, the U.S. Environmental Protection Agency, and State Representative Stephen Banton's office.

INFORMATIONAL PRESENTATION

Stan Jorgensen, chief of the Enforcement/Superfund Section of the Missouri Department of Natural Resources, opened the meeting with a presentation that covered the following subjects:

- Procedures for the meeting
- The meeting's purpose
- The steps that will follow selection of a storage alternative
- Site history
- The location of feasibility studies for public review
- The recommended alternative for disposal of non-dioxin wastes
- Four recommended alternatives for storage of dioxin wastes
- The costs of the different options
- The need for public input
- A probable timetable for site activities

CONCERNS

Participants at the meeting called attention to a number of concerns.

Fencing

Several persons expressed a great deal of concern that children and animals could obtain access to contaminated areas at present. Residents called for immediate fencing of the area bordering a bicycle path located on property owned by the City of Ellisville. A suggestion was made that fencing materials that had been used in the cleanup of another property in the area be used for a fence along the bike path. City and state officials indicated their agreement with the need for a fence and said they would try to have one installed.

Cleanup Schedule

Several participants expressed frustration over the anticipated 2-3 year time period needed for cleanup and storage activities. Stan Jorgenson explained further about how progress at the site depends partly on federal Superfund reauthorization, litigation with the property owner, and on state bid procedures. Area residents urged government officials to expedite all work at the site. One person said he would like to know what could be done to speed up action at the site before he went home that night. It was recommended that residents express their views on this subject to Morris Kay, EPA Region VII administrator; Dr. Frederick A. Brunner, Missouri Department of Natural Resources' director; their U.S. senators and representatives; and members of the Missouri General Assembly.

Condemnation of the Bliss Property

A couple of participants at the meeting questioned why the Bliss property has not been condemned, and expressed support for condemnation. Some discussion was held on whether the state or county could do this and on what basis. It was suggested that participants contact an attorney, the Missouri attorney general, or county officials to learn more.

Site Name

An objection to calling the property the "Ellisville Site" was raised. This was noted by state officials, who agreed that the site could be referred to by another name such as the "Bliss Site," except for items in the Federal Register.

Property Values

Comments pertaining to the various storage options indicated concern from some participatnts that the appearance of the storage facility could affect property values. (See the section on comments in this summary.) In addition, participants presented their views on whether posting signs on the proposed fence near the bike path would adversely affect property values. More support was expressed for not posting the fence than for doing so.

Health Effects

A participant at the meeting asked about the immediate and long-term health effects that could be caused by the substances at the site. Gale Carlson from the Missouri Department of Health explained the possible effects that might result from repeated exposure to dioxin. He made booklets on this subject available to those attending the meeting and provided some background information on the manufacture of dioxin. Carlson stressed that preventing people from coming into contact with dioxin-contaminated soil is a major concern of health officials.

Ground Water Contamination

A question was raised about the possible contamination of underground water supplies by dioxin and other substances at the site. Gale Carlson noted dioxin at the site is unlikely to contaminate water supplies, and that water sampling in the summer of 1985 had not found any dioxin in private water supplies in the area. It also was pointed out that other substances at the property are very harmful and could contaminate ground water if cleanup is not undertaken.

Dioxin Levels

In response to a question, Steve Kovac of the U.S. Environmental Protection Agency noted that the highest dioxin concentration at the site was 120 parts per billion, which is neither the highest or lowest when compared to concentrations at other sites in the St. Louis area.

Sampling Locations

Two questions were asked concerning whether Strecker Road and hillsides near the Bliss property had been sampled. State officials noted these areas have not been sampled because there has never been any evidence that materials were dumped there. All past sampling was based on the reports of drivers or employees of the waste hauling firm as to where wastes had been taken, or on company records.

Time Elapsed

Concern was expressed over the length of time that has elapsed since discovery of the site. This bothered many persons at the meeting, who felt that more should have been accomplished in the time that has elapsed. State and local officials agreed.

Funding

One person noted that he would hate to see the project started and then stopped without being completed. He also wondered whether the cost estimates included restoring the area to its original state. It was explained that the cost estimates do include putting the land back in its natural state.

Bliss Business Operations

Questions were raised about whether the Bliss Oil Company was still operating. Stan Jorgensen explained that the company no longer has a license to operate in Missouri. He noted that the state has conducted investigations to see if the company is operating. In each case where trucks were stopped, the trucks were owned by other companies who had not changed the name on the trucks, and they were not being operated by Bliss Oil. He also explained that although members of the Bliss family can no longer haul waste oil, this does not prevent them from using the trucks in other ways.

Contaminated Dirt On Road

The question was brought up as to whether trucks are tracking contaminated dirt off the property. An answer was not known. Comments were made about the high speed of some of the trucks.

Obligations To Purchasers

The obligation of sellers, builders, and real estate agents to inform prospective buyers of the hazardous waste site was discussed. While properties that are contaminated with hazardous wastes cannot be sold under state law, there are no laws pertaining to activities at nearby properties.

Testing During Cleanup

A couple questions were raised as to the amount of testing that would be done during cleanup and whether each buried drum would be tested individually. Officials noted that a great deal of additional testing will be required, and that each drum will be tested since it is against the law to ship an unknown hazardous substance.

COMMENTS

The following comments were presented at the meeting. They are listed in the order that participants spoke.

A monofill is the best storage alternative.
A representative from the city of Ellisville spoke in favor of a monofill for storing dioxin-contaminated materials. It was noted that a monofill with a grass cover would blend in with the topography and would be advantageous for property owners in the area since it would be less conspicuous. The representative from the city of Ellisville stated strong support for the monofill over all other options, noting he felt that any other solution to the interim storage of dioxin would not be in the best interest of the area's residents or the city. A second person voiced agreement with these statements.

Fencing is needed near the bike path.

The representative from the city of Ellisville recommended that the area near the bike path be fenced.

Extensive ground-water testing should be done at the site.
One person spoke in favor of additional ground-water testing at the site.

Something should be done about this at the local level rather than wait for the federal government. The government could subsidize a loan and we could put down the intitial payment for the cleanup.
One person made this recommendation.

A container facility with a synthetic membrane enclosure is the best storage alternative. It should be covered with dirt and grass.
One person noted that he felt there were severe technical and environmental disadvantages to a monofill that should eliminate it from consideration. He pointed out that the volume of waste stored per unit area is low; if excavation is halted temporarily, it is difficult to install and remove a temporary cover; possible large quantities of run-off and water percolating down through the material (called leachate) during the cleanup period would necessitate a large treatment facility; that it is difficult to operate equipment when fine-grained soil is wet; and that there is the potential for the slippage of materials in wet conditions. He also noted that a monofill would have a big fence around it, which would not be particularly aesthetic.

This person favored a container facility with a synthetic membrane enclosure. He noted this option would allow wastes to be containerized; it could be adjusted to accommodate varying volumes of waste; and it avoids contaminated run-off or leachate. He also noted that it could be covered with grass and dirt just as a monofill would be, except that it would be a lot safer to store materials in it, and a lot easier and safer to get rid of it when a method of disposal is available.

Containerized storage of some type is best.
A representative from the Missouri Department of Health recommended that the dioxin-contaminated materials be bagged and stored in either a metal building or a fabric-lined storage facility. He noted that bagged storage will prevent the possibility of the contaminated materials having to be handled twice and would lessen the possibility of wind carrying the dust particles around during excavation.

ADDITIONAL COMMENTS

The public meeting on March 31 was conducted during a public comment period that extended from March 17, 1986, to April 14, 1986. The Missouri Department of Natural Resources received two letters with comments during the comment period.

One letter recommended that the dioxin wastes at the Bliss site be stored in containers in a synthetic membrane enclosure. It was noted that this method offers safety, easier removal in the long run, flexibility in case the amount of dioxin-contaminated soil varies, and it has positive aesthetic values.

The other letter recommended that the soil be bagged and stored in a green building. It also was recommended that the storage building be located in the best spot regardless of present buildings on the property. In addition, immediate fencing of the property with a high, secure fence was recommended.

# # #

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April 2, 1986

Missouri Dept of Natural Resources
Box 176
Jefferson City, MO 65102

RECEIVED
APR 7 1986
WASTE MANAGEMENT
PROGRAM

re. Bliss and Contiguous Properties

Comments on clean-up of hazardous substances.

1. The dioxin laden soil should be bagged - it looks like this would create less dust and would make it easier to haul away sometime in the future.

2. The soil should be stored in some type of structure - painted green. The building should be located in the best spot irregardless of the building on the property now.

3. The property should be fenced immediately and the cost should be included in the request from the Superfund. The fence doesn't have to be labeled, but it should be high and secure. After the wastes are secured in the structure the fence should remain up.

Questions regarding the site.

1. Have you tested any residential areas nearby? If so what are the findings?

2. Did you know building of homes took place after the study of 1981-83 took place? Mr. Jorgensen said

that you didn't know about the bike path near the property until last week.

3. Would the property owners have access to the site during storage of the contaminated soil? (e.g. Bliss family)

4. Do you intend to monitor levels of dioxin laden dust in the air when clean-up is going on, and halt it if the levels get too high? What would be too high?

Thanks for the opportunity to comment and question.

David Royalty

1659 Clayton Spur Ct.
Ellisville Mo 63011

313 Clayton Trails Drive
Ellisville, MO 63011
April 9, 1986

Missouri Department of Natural Resources
Waste Management Program
P.O. Box 176
Jefferson City, MO 65102

re: Bliss and Contiguous Properties - Proposal for Storage of Dioxin-Contaminated Soil

As a homeowner in Wood Meadow subdivision, located adjacent to Russell Bliss property near Ellisville, MO., I suggest that the Container Storage Synthetic Membrane Enclosure method be used to store dioxin-contaminated soil. I also suggest that this enclosure, when completed, be covered with dirt and grass to blend in with the environment. I feel that this method has the best combination of safety while the soil is going to be contained and eventually removed, flexibility in case the amount of dioxin-contaminated soil varies, and the most aesthetic for appearance.

Sincerely,

Chet Duchnowski

Chet Duchnowski

RECEIVED
APR 11 1986
WASTE MANAGEMENT
PROGRAM

Attachment 16

73 CC: RA/DRA
EMSV

WSI011

JOHN ASHCROFT
Governor

FREDERICK A. BRUNNER
Director

STATE OF MISSOURI
DEPARTMENT OF NATURAL RESOURCES
OFFICE OF THE DIRECTOR
P.O. Box 176
Jefferson City, Missouri 65102
Telephone 314-751-4422

Division of Energy
Division of Environmental Quality
Division of Geology and Land Survey
Division of Management Services
Division of Parks, Recreation,
and Historic Preservation

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RECEIVED
SEP 24 1986
RCAD
EPA Region VII

September 19, 1986

Mr. Morris Kay
Regional Administrator
U.S. EPA Region VII
726 Minnesota Avenue
Kansas City, Kansas 66101

Dear Mr. Kay:

The Missouri Department of Natural Resources (MDNR) has completed its evaluation of the remedial action alternatives for the Bliss and Contiguous Properties, Ellisville Area Site, contained in the September 1983 Remedial Feasibility Study prepared by Black & Veatch Engineer-Architects and the February 1986 On-site Storage Focused Feasibility Study prepared by CH_2M-Hill.

It is our position that the best remedial alternative for non-2,3,7,8-TCDD hazardous substances is excavation and off-site disposal of buried drums and waste mixtures at appropriate RCRA or interim status facilities meeting current CERCLA off-site policy. Specifically, the alternatives are BD-5 (overpacking subalternative) and BWM-5.

The best remedial alternative for 2,3,7,8-TCDD contaminated soil is containerized storage in a building enclosure. Containers minimize the health and safety risks to workers, since they are filled at the point of excavation, and also serve as the primary liner for the storage facility. The steel building is recommended over the synthetic membrane enclosure because it can be easily expanded during construction, will be easier to inspect, and can be easily decontaminated and converted to other uses after final disposition of the 2,3,7,8-TCDD contaminated soil. It may be necessary to locate several smaller storage buildings on uncontaminated areas of the Bliss property or on adjoining properties, if greater storage capacity is needed. Since the storage building (or buildings) will be located near residential areas, we feel visual appearance is important and recommend that they be constructed of earth-tone siding or be painted an earth-tone color.

If you have any questions or comments on the recommended alternatives or the remarks contained in this correspondence, please do not hesitate to contact me.

Sincerely,

DEPARTMENT OF NATURAL RESOURCES

F.A. Brunner

Frederick A. Brunner, Ph.D., P.E.
Director

FAB:jsk

Attachment 17

Total Project Costs

Recommended Alternative	Engineering Design Cost	Implementation Cost
Offsite Disposal of Buried Drums (Overpacking Subalternative)	$120,000	$1,500,000
Offsite Disposal of Waste Mixtures (Non-dioxin hazardous waste)	$450,000	$5,700,000
Building-Enclosed Container Storage Facility (Dioxin-contaminated soils and materials)	$925,000	$13,000,000

Total Approximate Engineering Design Costs: $ 1,500,000

Total Approximate Implementation Costs: $20,200,000

Notes:
1) Total engineering design costs do not include any costs for predesign/design sampling.
2) Implementation cost for Container Storage Facility includes present worth costs for O&M and facility demolition.